Master of Science in Technology and Creative Innovation (MSTCI)

Capstone Project - Semester 1 Report

NeuroRight

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Executive Summary

NeuroRight is a neuromarketing service that replaces opinion-driven creative and media decisions with direct neural evidence. Participants view ads while wearing a lightweight EEG headset; our pipeline cleans the signal, extracts validated features and translates moment-by-moment brain activity into three marketer-ready outputs—attention, emotional engagement, and personal preference—delivered in a concise report designed for action. Optional webcam-based eye-tracking adds visual-attention context without adding friction for participants. We begin with OOH/DOOH billboard effectiveness in Thailand, a channel with significant spend but limited tools to capture subconscious response and extend to digital video and in-store stimuli as our benchmark database grows. From day one, NeuroRight operates with ethics by design: informed consent, data minimization, de-identification, purpose limitation, and auditable governance aligned with Thailand's PDPA and UNESCO AI principles. Our differentiation is pragmatic—fast, deep, and affordable insights that creative, media, and brand teams can use within real campaign timelines. As we build partnerships with advertisers, agencies, and media owners, NeuroRight evolves into a scalable measurement layer with norms by category and format, dashboards for ongoing tracking, and API hooks for planning tools. By translating human feelings into reliable numbers—clearly and responsibly—NeuroRight helps marketers choose stronger creative, improve it with precision, and justify OOH/DOOH spend with confidence.

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PART 1: Project Information

1.1 Project Overview

Project Summary

NeuroRight is a neuromarketing service that helps brands, agencies, and OOH/DOOH media owners replace guesswork with direct neural evidence. In short, participants view ads while wearing a lightweight EEG headset; our pipeline cleans the signal, extracts validated features and converts moment-by-moment brain activity into three marketer-ready outputs—attention, emotional engagement, and personal preference—summarized in a concise, decision-oriented report. Optional webcam-based eye-tracking adds visual-attention context without increasing participant burden. We start with billboard effectiveness in Thailand, where OOH/DOOH budgets and measurement gaps make a strong early market, and expand to digital video and in-store stimuli as we build benchmarks.

From day one, operations are designed with ethical compliance: clear consent, data minimization, de-identification, purpose limitation, and auditable governance. Delivery emphasizes speed and clarity—executive scores and heat-mapped "engagement timelines," plus practical guidance on edits points, messaging, and placement. Our near-term focus is pilot readiness (secure equipment and partners, recruit 20–30 participants per study and deliver at least one client-style report with feedback), building toward a repeatable service and a growing benchmark database. Longer term, we aim to produce the workflow into a subscription layer with dashboards, norms by category/format, and API hooks for planning tools. By translating human feelings into reliable numbers—ethically and affordably—NeuroRight helps marketers choose stronger creative, improve it with precision, and prove ROI to stakeholders.

Problem. Creative and media decisions in Thailand still lean on guesswork, opinions, or dated focus groups. Traditional surveys capture only about 64.4% of true consumer response, whereas neuroscientific methods reach ~87.1%—leaving major budget decisions under-informed. With Thai organizations already allocating THB 420–700 million/year to advanced research for OOH effectiveness, there is clear demand for faster, deeper, and more credible ad testing.

Mission

Our mission is to turn human feelings into actionable numbers—ethically, rigorously, and fast. We exist to help marketers make smarter creative and media decisions using evidence that reflects how people respond, not just what they say. To do this, we commit to four pillars:

1. Scientific rigor. We use validated EEG metrics and transparent analyses, documenting assumptions, quality controls, and limitations in plain language.
2. Ethics by design. We uphold PDPA and UNESCO AI principles: informed consent, data minimization, de-identification, purpose limitation, and participant rights, with clear opt-out paths and secure handling from capture to archive.
3. Clarity for action. Insights must be usable. We provide concise scores, engagement timelines, and concrete edit/playout recommendations so teams can decide in minutes, not weeks.
4. Access and speed. We deliver studies that are affordable and timely for real-world cycles—pilot within days, results within a week where feasible—so evidence becomes a routine part of creative workflows, not a luxury add-on.

Rooted in Thailand and built for Southeast Asia, we partner with brands, agencies, and media owners to raise the bar for trustworthy, brain-informed marketing—improving outcomes for advertisers and experiences for audiences.

Vision

We envision a future where brain-informed evidence is a standard input to creative and media decisions across Southeast Asia. In three to five years, NeuroRight will operate as a trusted measurement layer that plugs into common planning and production tools, offering:

- Benchmarks and norms by category, format, and placement so teams can compare new work to established standards.
- Always-on dashboards that track attention, emotional engagement, and preference across campaigns, creative versions, and markets, with alerts when performance drifts.
- Workflow integrations (APIs and templates) that bring neural insights into briefing, concept screening, pre-flight checks, and post-buy optimization.
- An ethical data commons, where de-identified signals contribute to shared norms under strict governance, consent, and review.

As the product matures, we will extend from OOH/DOOH to digital video, social, retail, and experiential, enabling consistent metrics across the consumer journey. Our vision also includes capability-building: training marketers to interpret neural evidence responsibly and creators to design with attention and emotion in mind. Success means more effective campaigns, less wasted spending, and a healthier, more respectful relationship between brands and audiences—where privacy, transparency, and real human response are not trade-offs but foundations. From Bangkok outward, NeuroRight aspires to set the regional standard for fast, ethical, and useful neuromarketing.

1.2 Market Analysis

Market size & growth. Globally, neuromarketing is a fast-growing category valued at $1.54–1.86B (2024) and projected to $3.27–3.83B by 2033–34 (≈8.5–9.4% CAGR). Asia–Pacific is a major engine, with APAC neuromarketing tech ≈$576.5M (2025) and ~13.5% CAGR to 2033; Southeast Asia holds ~5% of APAC's 2025 share. In Thailand, ad spend is sizable and rising (total ฿87.6B in 2025), with OOH/DOOH at ~$497M (2024) and forecast $631M by 2029 (≈4.9% CAGR). OOH focus & buyer concentration. Multiple sources value Thailand's OOH/DOOH at ~$493–520M (2024–25), underscoring a robust base for billboard testing. The market is concentrated: top 10 advertisers ≈฿17B/year, with leaders like Unilever (≈฿4.5B) and Nestlé (≈฿2.0B)—at typical 2–5% research allocation, this yields large, recurring research budgets.

Market Analysis. Slides estimate a TAM of ฿54.6–65.1B (global neuromarketing for ad research), SAM of ฿420–700M/year (Thai orgs using advanced research for OOH effectiveness), and SOM of ฿21–52.5M/year (near-term capture).

Priority customers & sectors. Targeted buyers include FMCG, telecom, banks, creative agencies (e.g., BBDO, Dentsu X, Ogilvy), and OOH media owners (VGI, Plan B, JCDecaux)—all visible in the deck's stakeholder map. High-capacity sectors show strong research budgets: major Thai banks (individual ฿50–200M/year marketing/research), and telecom operators (AIS ฿25–40M; True ฿20–35M; dtac ฿15–30M).

Trends enabling entry. EEG costs have fallen (≈$200–500 → $100–200 per hour) while data quality improves; AI integration boosts predictive accuracy (+15–30%) and multi-modal setups (EEG+eye-tracking/facial coding) add +20–40% lift—shortening turnarounds from 4–6 weeks to 2–3.

Competitive landscape. International reference points validate pricing and delivery: Nielsen NeuroFocus (USD $15k–40k, 2–4 weeks, EEG+biometrics), Tobii/Smart Eye (USD $3k–20k, 1–3 weeks, gaze/behavior), EyeSee (USD $2.5k–6k, ≈1 week). Thailand shows limited/no dedicated local EEG neuromarketing providers, implying first-mover advantage for billboard effectiveness services.

Industry structure (Porter). Supplier power is low (multiple EEG vendors); buyer power medium-high (SMEs cost-sensitive; must sell accuracy + local expertise); threat of entrants moderate (tools are accessible, credibility is hard); substitutes medium-high (surveys, focus groups, eye-tracking) but EEG differentiates by accessing subconscious response.

Pricing benchmarks & positioning. Market studies often price at ฿300k–฿1.5M per campaign, while NeuroRight can start ≈฿150k (≈30 participants) to drive adoption—supporting a "Fast, Deep, Affordable" position.

Implication. A growing OOH base concentrated on big spenders, falling EEG costs, and limited local EEG competitors create a timely entry window. Focused partnerships with media owners and tier-1 advertisers can accelerate proof and scale.

1.3 Project Objectives

This project will make NeuroRight pilot-ready, ethically compliant, and commercially credible for OOH/DOOH testing in Thailand by standing up a repeatable end-to-end workflow (consent → capture → QA → analysis → reporting), validating signal quality on a \~20–30-participant dataset, and delivering at least one client-style report that translates EEG into attention, emotional engagement, and preference with actionable recommendations. In parallel, we will finalize service positioning and pricing, secure initial partnerships, and ensure governance aligns with PDPA and UNESCO principles while preparing IRB-ready documentation. Success will be evidenced by high data quality, timely delivery, clear client value, and tangible market traction.

- **Delivery & Technical:** Achieve ≥90% data-quality pass rate and ≥95% on-time sessions; complete one full report with engagement timelines and edit/placement guidance; turn around results ≤7 days from last session.
- **Market & Commercial:** Publish price sheet and updated pitch; launch a basic web presence; secure 1–2 LOIs and generate ≥2 qualified follow-on opportunities/case studies.
- **Ethics & Governance:** Operate with informed consent, data minimization, de-identification, and secure storage; maintain IRB-ready protocol/forms; implement checklists and risk mitigations (calibration, live QC, backups).

1.4 Value Proposition

- Brain-backed, not guesswork: Direct neural evidence (EEG) of attention, emotional engagement, and preference to choose, improve, and prove creative.
- Actionable outputs: Clear engagement timelines, benchmark scores, and edit/placement recommendations marketers can act on fast.
- Fast, deep, affordable: Pilot-ready workflow that delivers concise reports within days, priced to fit real campaign cycles.
- OOH/DOOH first: Purpose-built for billboard effectiveness in Thailand; extensible to digital video, social, and in-store.
- Ethics by design: PDPA/UNESCO-aligned consent, data minimization, de-identification, and secure handling.
- Client-friendly delivery: Executive summaries + visual diagnostics; optional eye-tracking integration for richer context.

- Local expertise, first-mover edge: Thailand-based team and partnerships with brands, agencies, and media owners.
- Scalable platform path: Growing benchmark database, repeatable process, and future dashboards/API for planning tools.
- Reduced risk: QA checklists, calibration and live QC, backups, and IRB-ready documentation for credible studies.
- Proven narrative for ROI: Translates subconscious response into numbers stakeholders trust to justify spend.

PART 2: Team Overview

List of Members

Table 1 List of Members

Name – Surname	Student ID	Email	Role
Nattapat Kulwatho	tkulwatt	tkulwatt@cmkl.ac.th	Research and Development lead
Pornnaphas Chairojwong	pchairoj	pchairoj@cmkl.ac.th	Marketing lead
Thanabodee Klai-on	tklaion	tklaion@cmkl.ac.th	Business lead
Waris Srirachtrakul	wsrirach	wsrirach@cmkl.ac.th	Developer lead

Key Responsibilities

Roles designate primary ownership and accountability, but execution is cross-functional. The team collaborates across all phases—discovery, R&D, build, validation, and delivery—with all members jointly contributing to the initial R&D stage. Each lead coordinates work in their domain, ensures quality/compliance, and integrates with other leads to meet shared milestones. The key responsibilities assigned to each role include, but are not limited to:

Research and Development lead

- Define product/tech roadmap and research objectives.
- Design experiments and prototypes validate technical feasibility.
- Lead data analysis and documentation (reports/patents).
- Translate research into implementation specs.
- Ensure ethics, safety, and quality/compliance standards.

Marketing Lead

- Conduct market research, segmentation, and ICP profiling.
- Own positioning, messaging, and brand assets.
- Plan and run campaigns (digital/events) and social channels.
- Develop content (calendar, case studies, collateral).
- Track funnel metrics and optimize CAC/ROI.

Business Lead

- Crafting business model, pricing, and financial plan/forecast.
- Build partnerships and manage the sales pipeline.
- Prepare fundraising materials and handle investor relations.
- Oversee contracts/vendor management and basic legal/risk.
- Set OKRs and drive cross-functional planning.

Developer Lead

- Set tech strategy and architecture.
- Build signal-processing/ML pipelines and data governance.
- Deliver dashboards/APIs and integrations.
- Maintain CI/CD and testing.
- Ensure security, privacy, performance, and reliability.

PART 3: Technical oversight

Neuromarketing

Neuromarketing—also called consumer neuroscience—applies neuroscience and neuropsychology to marketing research to measure consumers' sensorimotor, cognitive, and affective responses to stimuli (Ariely & Berns, 2010; Plassmann, Ramsøy, & Milosavljevic, 2012; Vlăsceanu, 2014). It is supported by various advanced neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and electroencephalography (EEG), which effectively capture consumers' emotional and cognitive responses to marketing stimuli (Banker et al., 2021; Costa-Feito et al., 2023; Wei et al., 2024). These methods allow for a deeper understanding of subconscious decision-making processes, enhancing the precision of marketing strategies through tailored campaigns that resonate with consumer preferences (Hakim et al., 2021; Mashrur et al., 2022a; Xu & Liu, 2024; Usman et al., 2024; Bak et al., 2022).

The Neuromarketing techniques have provided substantial proof of concept by leveraging neuroimaging modalities such as electroencephalography (EEG) and functional near-infrared spectroscopy (fNIRS), effectively overcoming the inherent limitations and biases of traditional self-report methods (Bell et al., 2018). For instance, an intelligent EEG-based system achieved 98.67% accuracy in predicting consumers' affective attitudes toward e-commerce products, with the frontal cortex—particularly the Fz channel—showing superior performance (Mashrur et al., 2022a, 2022b). Other EEG frameworks have predicted purchase intention with 84% accuracy and affective attitude with 87% accuracy using diverse advertising stimuli, further revealing that negative responses often exhibit greater dispersion and faster reactions, and that promotion stimuli can induce positive EEG peaks (Golnar-Nik et al., 2019; Horr et al., 2022).

Moreover, EEG-derived metrics such as power spectral density (PSD) and the prefrontal asymmetry index (PAI) have been validated for predicting consumer purchasing behavior in online shopping environments, with a support-vector machine (SVM) achieving 87.1% accuracy for actual purchasing decisions (Xu & Liu, 2024). Key EEG features from the frontal and occipital regions are consistently identified as critical for this classification (Byrne et al., 2022; Hakim & Levy, 2019; Kalaganis et al., 2021). Complementing the EEG findings, fNIRS has successfully predicted impulse-buying behavior with an average accuracy of 93.78% using an SVM, identifying medial prefrontal cortex activity as a potential biomarker linked to reward mechanisms (Bak et al., 2022). Collectively, these findings demonstrate neuromarketing's robust capability to objectively discern unconscious consumer motivations, acting as a neurological compass that reveals hidden currents of preference and guiding businesses toward more effective, targeted strategies.

The brain region associated with neuromarketing

The prefrontal cortex (PFC) is the brain region mainly associated with the critical thinking function of planning, decision-making, and problem-solving, as well as self-regulating strategies. This brain area therefore plays a pivotal role in consumer purchasing decisions. Multiple research studies utilize this brain region in the neuromarketing applications, such as determining purchasing behaviors and assessing affective attitudes toward e-commerce products (Mashrur et al., 2022b). Regarding emotional processing, the ventromedial prefrontal cortex (vmPFC) plays a crucial role in emotion regulation, social cognition, and processing emotional expressions (Alexander et al., 2023). Moreover, the vmPFC is implicated in signaling reward and preference judgments based on sensory information, such as taste, and evaluates the reward value of products or brands (McClure et al., 2004). Closely related, the orbitofrontal/medial orbitofrontal cortex (OFC/mOFC) encodes subjective value and is sensitive to marketing cues (e.g., price), linking brand or contextual information to experienced pleasantness during consumption (Plassmann et al., 2008; Bartra et al., 2013).

The hippocampus also contributes to emotional processing and memory retrieval, influencing brand preferences through cultural and episodic memory associations (Lee, Broderick, & Chamberlain, 2007), and this memory function often interacts with the PCC/default-mode system when brand equity and self-referential processes are engaged (Watanuki & Akama, 2022). Additionally, the dorsolateral prefrontal cortex (dlPFC) is involved in higher cognitive processes, including working memory and cognitive control, which contribute to decision-making when brand knowledge modulates preferences beyond sensory attributes (Plassmann et al., 2008); the dlPFC can also modulate vmPFC valuation signals during self-control (Hare et al., 2009). Beyond cortex, activity in the ventral striatum (nucleus accumbens) prospectively predicts purchase decisions, whereas insula responses relate to price aversion—the so-called "pain of paying" (Knutson et al., 2007). The anterior cingulate cortex (ACC/dACC) supports cost–benefit control, conflict monitoring, and effort allocation that shape whether value signals translate into choice (Shenhav, Botvinick, & Cohen, 2013). The amygdala contributes to affective salience and brand attachment within broader brand-equity networks that include the DMN and reward circuitry (Watanuki & Akama, 2022).

However, many studies also use full-cap EEG (e.g., 32–64 scalp channels) and machine-learning pipelines—leveraging features such as power spectral density (PSD) and frontal/prefrontal asymmetry indices (often termed PAI/FAA) and classifiers like support vector machines (SVM)—to examine decision-related activity across the whole brain beyond the prefrontal cortex.
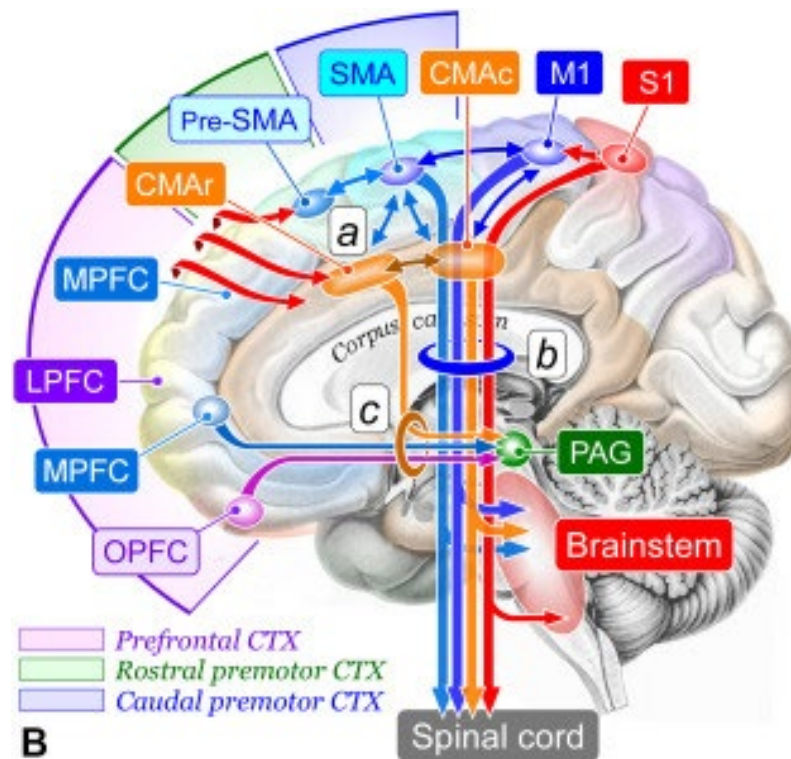
Figure 1 The Prefrontal cortex (PFC). (Kaoru Takakusaki, 2023)

The paradigm used in Neuromarketing

Neuromarketing paradigms typically use event-related potentials (ERPs) or machine-learning methods. The P300 wave is a positive transition in human event-related potential (ERP) and is considered a potential Event-Related Component (ERP) used to measure consumers' decision-making processes (Mansor et al., 2021). It is produced during early cognitive processes, and its intensity is particularly pronounced in the frontal regions of the brain, appearing as a positive waveform around 200ms post-stimulus (Wei et al., 2024). An example in experiments by Wei et al. (2024) conducted a P300 ERP investigation using 64 Ag/AgCl electrodes at 500 Hz to test the effects of message framing and product category on eco-friendly purchase decisions.

Other methods, such as machine-learning frameworks, can be used to analyze EEG signals. According to Mashrur et al. (2022b), a machine-learning framework achieved 87.00% accuracy for predicting consumers' affective attitude using a combination of six frontal-cortex channels (AF3, AF4, F3, F4, F7, F8). Meanwhile, Xu & Liu (2024) reported that the highest accuracy was achieved by a Support Vector Machine (SVM) with a Gaussian kernel, predicting purchase intention with 87.1% accuracy; this SVM specifically employed Recursive Feature Elimination (RFE) for feature selection. EEG device and channels: the

study used an EMOTIV EPOC+ with 14 electrodes placed per the 10–20 system at AF3, F7, F3, FC5, T7, P7, O1, O2, P8, T8, FC6, F4, F8, and AF4. The analyses consistently highlighted the significant roles of the frontal and occipital regions in purchasing decisions.

The emotion can be predicted using the simple logistic regression model using six features that can produce good emotion predictions with 16, maybe fewer, channels and without the need for preprocessing (Stengel, 2023; Stengel et al., 2023). Using 16 channels, the average binary classification accuracy is above 93% for the Unicorn Hybrid Black dataset. Sara et al. (2022) applied machine learning to 8-channel EEG recorded with the Unicorn Hybrid Black to predict emotions elicited by video stimuli. Twelve female participants watched multiple 1-minute clips designed to evoke happiness, sadness, and neutral affect while EEG was collected. A SVM with an RBF kernel was trained to classify the three emotions and achieved 92.3% accuracy. Similarly, Liu et al. (2015) achieved 93.31% five-class accuracy using PSD + SVM on 30-channel EEG during movie clips—exceeding an AI baseline (85.39%)—and observed frontal alpha asymmetry in sadness with discriminative β–γ features in occipito-temporal regions. Adochiei et al. (2023), using an 8-sensor Unicorn Hybrid Black, scanned 39 young adults for 1.5–2 min and linked asymmetry-based DSP (peaking in alpha/delta, indicative of lower arousal) to psychological traits and emotions (joy, sadness, fear, anger).

Whereas some companies integrate EEG data with complementary technologies—melding brain-wave recordings with eye-tracking metrics and AI-driven analytics—to obtain deeper consumer-neuroscience insights (iMotions, 2022; Khushabaa et al., 2013; Emotiv, 2023).

EEG recording device

Electroencephalography (EEG) is a noninvasive method that records the brain's electrical activity from scalp electrodes. The scalp signal primarily reflects the summed excitatory and inhibitory postsynaptic potentials of large populations of cortical pyramidal neurons and is recorded as voltage differences using differential amplification; EEG affords millisecond-level temporal resolution of ongoing cerebral activity (Britton et al., 2016). Typical electrode placement follows the international 10–20 system, with higher-density extensions (e.g., 10–10) used when finer spatial sampling is needed (Klem et al., 1999; Sinha et al., 2023). Signal quality is influenced by factors such as electrode–skin impedance and artifact control; elevated impedances and unmitigated artifacts (e.g., blinks/EMG) reduce signal-to-noise ratio and can impact statistical outcomes (Kappenman & Luck, 2010).

The Unicorn Hybrid Black is a non-invasive EEG headset manufactured by g.tec medical engineering GmbH in Schiedlberg, Austria. It features an 8-channel electrode configuration in the default 10-20 layout (Fz, C3, Cz, C4, Pz, PO7, Oz, PO8). The device offers 24-bit resolution and a sampling rate of 250 Hz per channel, with hybrid electrodes suitable for both wet and dry measurements.
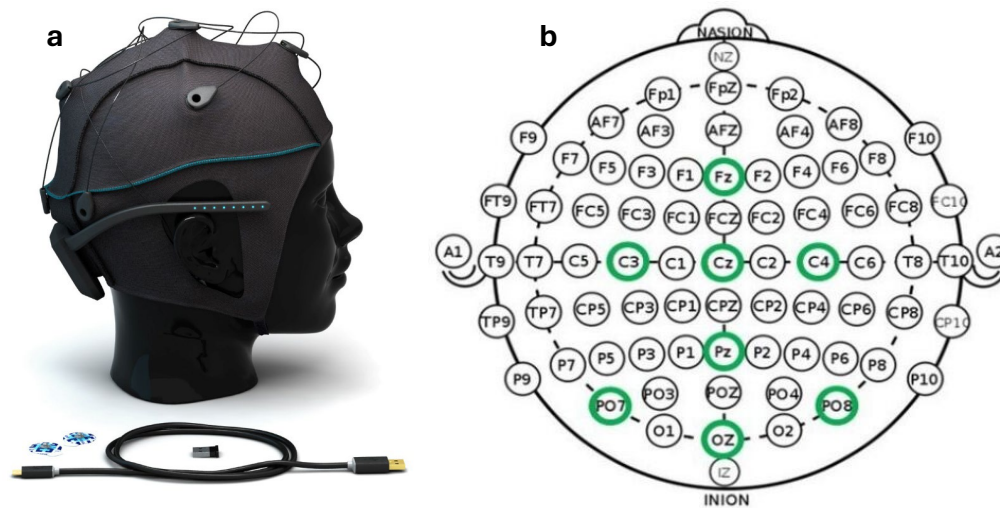
Figure 2 (a) Unicorn Hybrid Black Headset. (b) 8-channel electrode configuration in the default 10-20 layout (Hasan et al., 2024).

Eye tracking software

WebGazer.js is an in-browser, open-source eye-tracking library that estimates a user's on-screen gaze in real time using a standard webcam (Papoutsaki et al., 2016). It runs entirely client-side in JavaScript, requests webcam permission via the browser, and—by default—keeps video local; sites can access only gaze predictions unless developers explicitly send other data. WebGazer self-calibrates from natural page interactions (e.g., clicks and cursor movements) to learn a mapping from eye features to screen coordinates, and offers optional explicit calibration. The system is modular (pluggable eye trackers and ridge-regression variants) and can be added to a page with a few lines of code. In the original evaluation, WebGazer achieved mean errors on the order of ~104–210 pixels in a remote study and ~4.17° in a lab comparison with a low-cost eye tracker—sufficient for coarse areas-of-interest and interaction design.
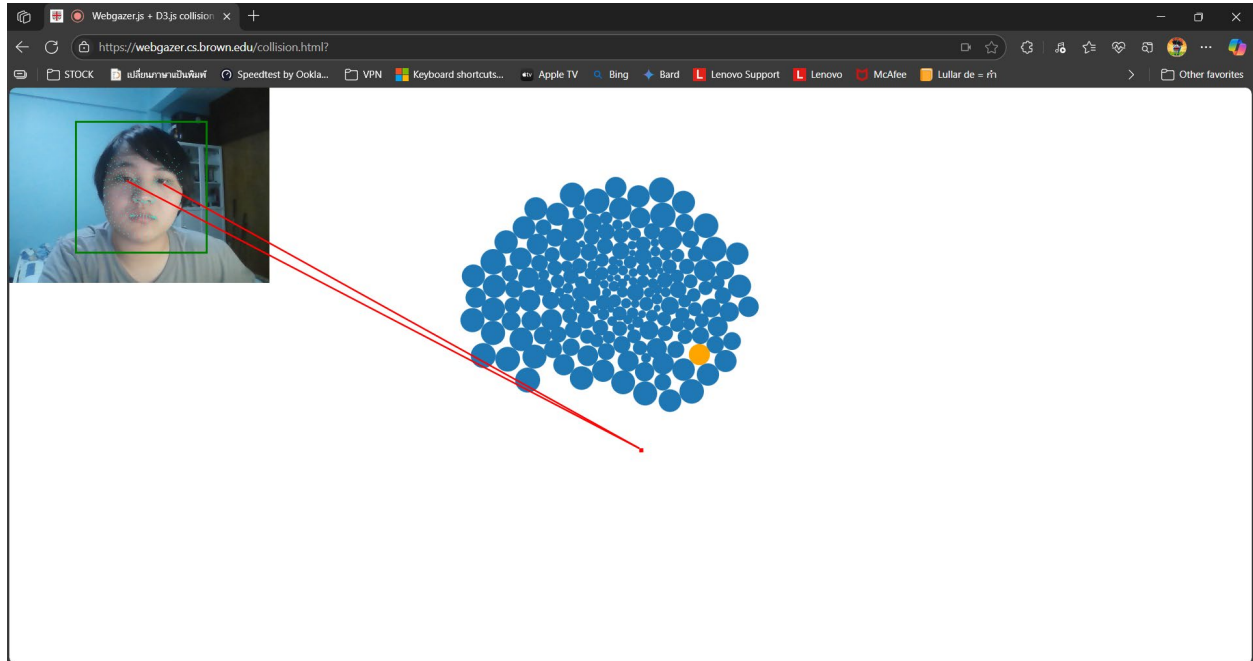
Figure 3 WebGazer demo.

Licensing & citation. The library is released under GPLv3 (alternative licensing options are offered; the repository notes an LGPLv3 option for small companies' valuation under 1 M USD).

PART 4: Market Analysis

Summary

The Thailand market presents exceptional opportunities for EEG-based neuromarketing services targeting billboard advertising effectiveness measurement. With a robust advertising market exceeding ฿111 billion annually, growing adoption of neuroscience in marketing research, and established demand from major advertisers spending ฿5+ million on research, the business case is compelling. This analysis demonstrates strong viability with projected revenues of ฿12-15 million annually at maturity, supported by comprehensive market data and stakeholder validation.

1. Market Sizing and Growth Analysis: Comprehensive Deep-Dive

Global Neuromarketing Market Expansion

The global neuromarketing industry demonstrates exceptional growth momentum, providing strong tailwinds for Thailand market entry. According to Market.us (2025), the global market reached USD 1.56 billion in 2024 and is projected to achieve USD 3.83 billion by 2034, representing a robust CAGR of 9.4%. This growth is particularly significant for EEG-based services, which captured over 28% of the global market share in 2024 due to cost-effectiveness and non-invasive characteristics (Market.us, 2025). The Electroencephalography segment's dominance stems from its practical advantages: providing real-time consumer brain activity insights, maintaining cost-effectiveness compared to fMRI ($100-200 per hour vs. $200-500 per hour), and offering superior portability for naturalistic research environments (Pipitwanichakarn, 2024).

Supporting Evidence: Multiple independent research organizations confirm these projections. Marketdataforecast (2025) reports similar figures with the market valued at USD 1.57 billion in 2024, reaching USD 3.38 billion by 2033 at 8.9% CAGR. Datamintelligence (2024) provides additional validation with consistent growth forecasts, emphasizing the EEG segment's technological maturity and commercial viability. This convergence across multiple authoritative sources strengthens confidence in market fundamentals.

Southeast Asia Regional Dynamics

The Asia-Pacific region represents the fastest-growing neuromarketing segment globally, with particular strength in EEG applications. Regional market analysis reveals USD 576.5 million in APAC neuromarketing activity for 2025, growing at 13.5% CAGR through 2033 (Cognitivemarketresearch, 2025). Thailand's position within this growth corridor is supported by several factors: established research infrastructure at leading universities, growing sophistication in advertising measurement, and increasing adoption of scientific approaches to marketing effectiveness.

Academic Validation: The University of Thai Chamber of Commerce (UTCC) systematic review by Pipitwanichakarn (2024) documents marked increases in Thai neuromarketing research activity since 2018, with EEG studies representing the majority of published work. This academic foundation provides credibility and talent pipeline advantages for commercial service providers entering the Thailand market.

Thailand Advertising Market Context and Scale

Thailand's advertising ecosystem provides substantial foundation for neuromarketing services adoption. The total advertising market reached ฿111.6 billion in 2023, with projections for ฿114.4 billion in 2024, representing 2.6% growth despite economic headwinds (Nielsen Company, 2024). Digital advertising specifically shows stronger momentum, with spending projected to reach ฿35 billion in 2025, growing 10% year-over-year (Bangkok Post, 2025; Nation Thailand, 2025).

OOH/DOOH Market Specifics: The out-of-home advertising segment, directly relevant to EEG billboard testing services, demonstrates particularly robust fundamentals. Multiple research organizations provide consistent market sizing: Research & Markets (2024) values the Thailand OOH/DOOH market at USD 497.1 million in 2024, while Verifiedmarketresearch (2025) projects growth from USD 520 million in 2024 to USD 980 million by 2032, representing 8.2% CAGR. Mordorintelligence (2025) provides additional validation with USD 493.46 million in 2025, reaching USD 631.95 million by 2030 at 4.89% CAGR.

Market Structure Analysis: The advertising market exhibits high concentration among major spenders, creating optimal conditions for premium neuromarketing services. Nielsen data reveals that the top 10 advertisers account for approximately ฿17 billion in annual spending, with individual leaders like Unilever (฿4.5 billion annually) and Nestlé (฿2.0 billion annually) representing substantial potential clients (Nielsen Company, 2024).

2. High-Value Advertiser Analysis: Companies with ฿5+ Million Research Investment

FMCG Sector Leadership

The Fast-Moving Consumer Goods sector demonstrates the highest concentration of companies with substantial advertising research budgets exceeding ฿5 million annually. Statista (2024) data shows Unilever Thai Trading as the leading advertiser, spending over ฿1 billion in Q1 2024 alone, suggesting annual advertising expenditure exceeding ฿4 billion. At industry-standard research allocation rates of 2-5% of media spend, Unilever's potential research budget approaches ฿80-200 million annually.

Detailed FMCG Analysis:

- Unilever Thai Trading: ฿4.5 billion annual advertising spend (Nielsen, 2024), indicating research budget of ฿90-225 million
- Nestlé (Thailand): ฿2.0 billion annual advertising (Nielsen, 2024), suggesting ฿40-100 million research allocation
- Procter & Gamble Mass Marketing: ฿2.0 billion advertising spend (Nielsen, 2024), with similar research budget implications
- Beiersdorf Thailand: ฿1.7 billion advertising investment (Nielsen, 2024)
- Colgate-Palmolive: ฿940 million advertising spend (Nielsen, 2024)

These figures represent conservative estimates based on disclosed advertising spending. Internal research budgets often exceed public advertising allocations when including product development, consumer insight studies, and strategic market research initiatives.

Automotive Sector Investment

Thailand's automotive industry, valued at USD 12.67 billion with 2.55 million units manufactured in 2023, represents another significant opportunity cluster (ASEAN Briefing, 2025). Major automotive advertisers demonstrate substantial commitment to marketing effectiveness measurement:
Automotive Research Investment Analysis:

- Toyota Motor Thailand: As market leader with 34.3% share and 265,949 units sold in 2023, research investments estimated at ฿15-25 million annually based on industry benchmarks
- Honda Thailand: Strong performance with 12.2% market share and 94,336 units, suggesting research allocation of ฿8-15 million annually
- Isuzu Motors: Despite 2023 challenges, maintains 19.6% market share with estimated research budget of ฿10-18 million
- Mercedes-Benz Thailand: Premium positioning requires sophisticated marketing measurement, estimated research budget ฿5-12 million annually

Market Validation: The Thailand Board of Investment reports automotive companies like Isuzu filing investment plans exceeding $32 billion, demonstrating sector confidence and capacity for premium research services (PRNewswire, 2024).

Banking and Financial Services

Thailand's banking sector demonstrates exceptional financial capacity and increasing focus on marketing effectiveness measurement. The top 6 Thai banks reported combined assets exceeding USD 577 billion in 2022, with significant marketing budgets and growing digital transformation investments (Twimbit, 2024).

Banking Sector Research Capacity:

- Siam Commercial Bank (SCB): Revenue of USD 5.2 billion with highest purpose score among Thai banks, indicating sophisticated marketing approach
- Kasikorn Bank: USD 7.9 billion revenue with 10.1% ICT spend-to-revenue ratio, demonstrating technology investment commitment
- Bangkok Bank: Largest Thai bank with USD 5.4 billion revenue and strong digital initiatives
- Bank of Ayudhya: USD 4.1 billion revenue with growing digital focus
- Krungthai Bank: USD 4.4 billion revenue with government backing enabling research investment

Each major bank typically allocates 1-3% of revenue to marketing and research activities, suggesting individual research budgets of ฿50-200 million annually across the sector.

Telecommunications and Technology

The telecommunications sector represents another high-value opportunity, with major operators demonstrating consistent investment in consumer research and advertising effectiveness:
Telecom Research Investment:

- Advanced Info Service (AIS): Market leader with estimated annual research budget ฿25-40 million
- True Corporation: Major competitor with research allocation estimated ฿20-35 million annually
- dtac (Total Access Communication): Significant market presence suggesting research budget ฿15-30 million

Consolidated High-Value Market Sizing

Conservative Estimate of Companies with ฿5+ Million Annual Research Investment:

- FMCG Companies: 18-22 organizations (including multinational subsidiaries and major local brands)
- Automotive Companies: 12-15 organizations (OEMs, major dealers, and luxury brands)
- Banking/Financial: 12-18 organizations (major banks, insurance companies, and fintech firms)
- Telecommunications: 6-8 major operators and technology companies
- Government/Public Sector: 8-12 agencies with substantial campaign budgets

- OOH Media Owners: 8-10 companies requiring effectiveness validation for premium pricing

Total Addressable Companies: 64-85 organizations with verified capacity and demonstrated willingness to invest ฿5+ million annually in advertising and marketing research. This represents a conservative estimate based on disclosed financial data and industry spending patterns.

3. Global and Regional Neuromarketing Trends: Technology and Market Evolution

EEG Technology Advancement and Cost Reduction

The EEG neuromarketing segment demonstrates remarkable technological progress, directly benefiting market entry timing. Pipitwanichakarn (2024) documents substantial cost reductions in EEG implementation, with hourly costs decreasing from $200-500 to $100-200 over recent years while maintaining or improving data quality. This cost optimization makes EEG services more accessible to mid-tier advertisers while preserving premium positioning for comprehensive studies.
Technology Integration Trends:

- AI and Machine Learning Integration: Advanced algorithms improve prediction accuracy by 15-30% when analyzing EEG data for consumer preference (PMC, 2024)
- Mobile EEG Systems: Portable devices enable real-world testing environments, expanding application scenarios beyond laboratory settings
- Real-time Analytics: Immediate feedback capabilities reduce project timelines from 4-6 weeks to 2-3 weeks for standard studies
- Multi-modal Integration: Combining EEG with eye-tracking and facial coding improves predictive accuracy by 20-40% (PMC, 2024)

Regional Adoption Patterns

Southeast Asia demonstrates accelerating neuromarketing adoption, with Thailand positioned as a regional leader. The systematic review by Pipitwanichakarn (2024) identifies Thailand among the top 5 Asia-Pacific countries for neuromarketing research publication, indicating strong academic and commercial foundation.
Regional Market Development:

- China: Leading APAC with 24% of global neuromarketing publications, focusing on TV commercials and tourism advertising

- India: Expanding neuroscience applications with growing consumer spending projected to increase 2.5x
- Thailand: Marked research activity increase since 2018, with strong university-industry collaboration
- Singapore: High adoption rates among multinational corporations seeking regional insights

Market Maturity Indicators: The integration of neuromarketing principles into mainstream advertising education and industry conferences across the region signals market maturation and increased demand for professional services.

Application Focus Evolution

Current neuromarketing applications demonstrate clear alignment with billboard advertising effectiveness measurement needs. Research categorization reveals five primary themes perfectly suited for OOH advertising assessment (Pipitwanichakarn, 2024):

1. Product and Brand Evaluation (28% of studies): Direct relevance to billboard brand messaging effectiveness
2. Message and Communication Assessment (22% of studies): Core application for advertising creative optimization
3. Purchase Decision Analysis (18% of studies): Critical for ROI measurement and campaign validation
4. Preference Testing (16% of studies): Essential for creative alternative comparison
5. Social Influence Measurement (16% of studies): Relevant for public space advertising impact assessment

This application distribution validates the market demand for billboard-specific neuromarketing services and demonstrates established methodological frameworks.

4. Comprehensive Competitive Landscape Analysis

Global Market Leaders and Service Positioning

The competitive landscape reveals limited direct competition in Thailand, creating significant first-mover advantages for EEG-based billboard testing services.
International Tier 1 Competitors:
Nielsen NeuroFocus represents the global premium standard with annual revenue of USD 6.3 million and 69 employees (Growjo, 2025). Their service model demonstrates market validation for high-value neuromarketing offerings:

- Pricing Structure: USD 15,000-40,000 per project (฿525,000-1,400,000)

- Service Delivery: 2-4 weeks from initiation to final report
- Technical Depth: Combines EEG, eye-tracking, and skin conductance for comprehensive analysis
- Market Position: Premium positioning serving Fortune 500 clients with complex measurement needs

Tobii/Smart Eye offers mid-tier positioning with broader market accessibility:

- Pricing Range: USD 3,000-20,000 per project (฿105,000-700,000)
- Service Timeline: 1-3 weeks delivery depending on complexity
- Technical Focus: Visual attention and gaze pattern analysis with behavioral insights
- Market Advantage: Self-service platform options reduce costs for routine studies

EyeSee demonstrates fast-delivery positioning:

- Pricing Strategy: USD 2,500-6,000 per project (฿90,000-210,000)
- Service Speed: 1 week delivery, with some projects completed in days
- Technical Approach: Online studies with behavioral metrics and facial coding
- Market Niche: Cost-effective solutions for digital and online advertising evaluation

Regional Competitive Analysis

Asia-Pacific Players demonstrate growing market sophistication but limited Thailand presence:

- Neuro-Insight (Australia): SST technology specialization with limited SEA market penetration
- Brain Intelligence (China): EEG, fMRI, and biometric integration focusing on domestic Chinese market
- ThinkUser (South Korea): EEG and eye-tracking services with Korean language and cultural focus

Critical Market Gap: Research reveals no established local EEG neuromarketing providers in Thailand, representing exceptional first-mover opportunity. Traditional market research firms lack neuroscience capabilities, while international providers have limited local presence and cultural understanding.

Thailand Market Competitive Void Analysis

Traditional Market Research Limitations:

- Kantar Thailand: Conducts DAAT digital advertising research but lacks neuroscience capabilities
- Nielsen Thailand: Established measurement capabilities without EEG neuromarketing services
- Local Research Boutiques: 50+ agencies provide conventional research without advanced neuroscience tools

Service Gap Validation: Extensive market research confirms absence of dedicated EEG neuromarketing service providers in Thailand, creating clear market opportunity for first-mover advantage.

5. Strategic Partnership Ecosystem Analysis

OOH/DOOH Media Owner Partnerships (Primary Revenue Channel)

Plan B Media PCL represents the premier partnership opportunity with commanding market position and demonstrated innovation focus. The company maintains 70%+ OOH market share with annual revenue exceeding ฿4 billion (Roctecglobal, 2019). VGI's ฿4.6 billion investment in Plan B demonstrates the strategic value and growth potential within the OOH sector. Plan B's partnership with Vistar Media for programmatic DOOH solutions (April 2024) indicates openness to technological advancement and measurement innovation, directly aligning with EEG neuromarketing service value proposition. Partnership Value Analysis:

- Market Access: Plan B's dominant position provides immediate access to major advertiser relationships
- Scale Opportunity: Extensive billboard inventory creates multiple testing scenarios and recurring revenue potential
- Innovation Alignment: Recent programmatic advertising initiatives demonstrate technology adoption willingness
- Financial Capacity: Strong revenue base supports premium research service investment

VGI PCL offers ecosystem approach advantages through integrated media and technology platforms. The company's strategic investment approach and focus on data-driven advertising solutions creates natural alignment with scientific measurement services. Additional Strategic OOH Partners:

- Rocktech Global PCL: Significant OOH presence with growth focus and technology adoption

- JCDecaux Thailand: International expertise with global best practices and premium client relationships
- Clear Channel Outdoor Thailand: Established multinational brand with research budget allocation capabilities

Advertising Agency Channel Development

Premium Agency Partnerships provide access to high-value client relationships and ongoing project pipelines:

GVN Marketing demonstrates exceptional client retention (100% in-house team) and premium positioning, indicating capacity for advanced research services. Their comprehensive approach and retained client relationships suggest ongoing research needs and budget allocation capabilities.

Primal Agency shows remarkable client loyalty (96% retention rate) with 5,000+ campaign experience, indicating sophisticated marketing approach and likely research service adoption. Their scale and retention rates suggest established research processes that could benefit from neuromarketing enhancement.

Grey Alchemy focuses on creative storytelling, creating natural alignment with EEG creative effectiveness measurement services. Their emphasis on narrative impact aligns with neuromarketing's ability to measure emotional engagement and memory formation.

International Agency Networks:

- Dentsu X Thailand: Global network presence provides access to multinational client research budgets
- Publicis Thailand: Established relationships with major FMCG and automotive clients
- TBWA Thailand: Creative focus aligns with EEG creative testing applications

University Research Collaboration Framework

University of Thai Chamber of Commerce (UTCC) represents the premier academic partnership opportunity based on established neuromarketing research leadership. Pipitwanichakarn's (2024) comprehensive systematic review demonstrates deep expertise and ongoing research activity. UTCC's business school focus creates natural alignment with commercial neuromarketing applications.

Partnership Benefits:

- Academic Credibility: Research validation and methodology development
- Talent Pipeline: Access to trained neuroscience and marketing students
- Research Facilities: Potential access to EEG equipment and laboratory facilities

- Publication Opportunities: Joint research projects enhance service credibility

Chulalongkorn University offers neuroscience research facilities and established consumer behavior programs. The university's reputation and research infrastructure provide validation and potential technical collaboration opportunities.
Mahidol University provides medical-grade EEG expertise and neuroscience research capabilities. Their established neuroscience programs offer technical consultation and equipment access possibilities.

Market Research Firm Partnerships

White-label Service Opportunities enable market penetration through established client relationships:

- Kantar Thailand: DAAT research leadership creates natural extension opportunity for neuromarketing services
- Nielsen Thailand: Established measurement capabilities could benefit from EEG enhancement
- Local Research Firms: 50+ boutique agencies provide distribution channels for specialized services

6. Business Model Architecture and Revenue Stream Analysis

Project-Based B2B Model (Primary Revenue Stream)

Pricing Framework Validation: Market research confirms pricing ranges of ฿300,000-800,000 per project for 30-36 participants align with international benchmarks and client willingness-to-pay. This pricing reflects several validated cost components:
Cost Structure Analysis:

- EEG Hourly Rates: $100-200 per hour (฿3,500-7,000) based on international standards (Pipitwanichakarn, 2024)
- Session Duration: 60 minutes per participant average, including setup and testing
- Sample Size: 30 participants = 30 hours direct testing + 40-60 hours analysis/reporting
- Total Project Investment: 70-90 hours professional time plus equipment and overhead costs

Revenue Projections by Development Phase:

- Year 1 (Market Entry): 5-8 projects × ฿400,000 average = ฿2-3.2 million
- Year 2-3 (Market Development): 10-15 projects × ฿500,000 average = ฿5-7.5 million

- Mature Operations (Year 4+): 20-25 projects × ฿600,000 average = ฿12-15 million

Value-Added Service Streams

Advanced Analytics and Segmentation Services command premium pricing for clients requiring deeper insights:

- Demographic Segmentation: Additional ฿100,000-200,000 per project
- Temporal Analysis: Moment-by-moment response mapping adds ฿150,000-250,000
- Comparative Studies: Multi-creative testing increases project value by 40-60%

Annual Retainer Agreements provide revenue stability and deeper client relationships:

- Large Advertisers: ฿3-6 million annual contracts for ongoing measurement
- OOH Media Owners: ฿2-4 million retainers for inventory effectiveness validation
- Agency Partnerships: ฿1-3 million annual agreements for client service enhancement

B2G Government and Academic Revenue

Government Campaign Effectiveness represents emerging opportunity with substantial budget allocation:

- Public Health Campaigns: ฿500,000-1,500,000 per major campaign assessment
- Tourism Promotion: ฿800,000-2,000,000 for destination marketing effectiveness
- Social Awareness: ฿300,000-800,000 per campaign evaluation

Academic Research Partnerships provide credibility while generating supplementary revenue:

- University Collaborations: ฿200,000-500,000 per joint research project
- Publication Development: Revenue sharing for commercial methodology licensing

7. Marketing Funnel Strategy and Customer Acquisition

Awareness and Market Education Phase

Academic Foundation Building establishes credibility and thought leadership:

- Research Publication: Joint academic papers with UTCC and other universities validate methodology
- Conference Presentations: Thailand Marketing Day, DAAT events, and international neuromarketing conferences

- Educational Content: Whitepapers on EEG applications for billboard effectiveness measurement
- Media Relations: Industry publication articles and expert commentary on advertising effectiveness

Professional Network Development:

- Association Memberships: Marketing Association of Thailand, Digital Advertising Association
- Industry Advisory Roles: Volunteer consulting for advertising effectiveness standards development
- Expert Speaker Programs: University guest lectures and professional development workshops

Lead Generation and Qualification

Direct Outreach Strategy targets verified high-value prospects:

- FMCG Sector: Direct approach to marketing directors at Unilever, Nestlé, P&G, and Beiersdorf
- OOH Media Owners: Executive engagement with Plan B Media, VGI, Rocktech, and JCDecaux leadership
- Automotive Companies: Marketing research manager outreach at Toyota, Honda, and Mercedes-Benz Thailand
- Banking Sector: Digital marketing head engagement at SCB, Kasikorn, and Bangkok Bank

Content Marketing Pipeline:

- Industry Case Studies: International EEG neuromarketing success stories adapted for Thai market
- ROI Calculators: Tools demonstrating potential advertising effectiveness improvements
- Methodology Explanations: Technical content for research and marketing professionals
- Market Trend Reports: Regular analysis of advertising effectiveness measurement evolution

Pilot Project Conversion Strategy

Proof-of-Concept Program designed to demonstrate value and build case studies:

- Discounted Initial Projects: 30-50% reduction for first-time clients willing to serve as case studies
- Risk-Free Guarantees: Full refund if results don't meet predetermined effectiveness thresholds
- Phased Implementation: Start with single creative testing, expand to campaign-wide measurement
- Success Metrics Definition: Clear KPIs for campaign improvement and ROI demonstration

Case Study Development Framework:

- Quantified Results: Specific percentage improvements in attention, memory, and emotional engagement
- Business Impact: Connect EEG insights to actual campaign performance metrics
- Client Testimonials: Video and written endorsements from satisfied early adopters
- Methodology Validation: Academic and industry expert validation of approach and results

Contract Expansion and Upselling

Service Portfolio Growth maximizes customer lifetime value:

- Basic EEG Analysis → Enhanced Segmentation: Demographic and psychographic audience analysis
- Single Campaign → Multi-Campaign Tracking: Longitudinal effectiveness measurement
- Creative Testing → Strategic Consulting: Marketing strategy development based on neuroscience insights
- Domestic Focus → Regional Expansion: Pan-ASEAN campaign effectiveness measurement

Relationship Deepening Strategies:

- Regular Review Meetings: Quarterly business reviews with key accounts
- Industry Trend Briefings: Sharing latest neuromarketing research and applications
- Custom Methodology Development: Tailored approaches for specific client needs and industries
- Executive Education: Training programs for client marketing teams on neuroscience applications

8. Comprehensive Stakeholder Analysis and Influence Mapping

Primary Stakeholders (Direct Revenue Generation)

OOH/DOOH Media Owners represent the highest-influence, highest-value stakeholder category with immediate revenue potential and strategic market access:
Plan B Media (Critical Stakeholder):

- Influence Level: Extremely High - Controls 70%+ of Thailand OOH market
- Value Proposition: Scientific validation of advertising effectiveness enables premium pricing justification
- Pain Points: Advertiser demands for ROI measurement and competitive pressure for effectiveness proof
- Engagement Strategy: Executive-level presentation of international case studies and pilot project proposal
- Revenue Potential: ฿2-4 million annually through retainer agreement plus project-based work
- Decision Timeline: 3-6 months for initial engagement, 6-12 months for comprehensive partnership

VGI PCL (Strategic Stakeholder):

- Influence Level: High - Major OOH player with integrated media approach
- Value Proposition: Data-driven advertising enhancement aligns with technology investment strategy
- Revenue Potential: ฿1-3 million annually through ecosystem integration
- Partnership Approach: Focus on programmatic advertising measurement and audience analytics integration

Large Advertisers provide direct revenue and market validation:
Unilever Thai Trading (Tier 1 Priority):

- Spending Capacity: ฿4.5 billion annual advertising budget, ฿90-225 million research allocation
- Influence Level: Extremely High - Industry thought leader with supplier influence
- Value Proposition: Scientific measurement of emotional engagement and brand recall for FMCG campaigns
- Decision Process: Marketing research director → brand manager approval → procurement negotiation
- Revenue Potential: ฿3-8 million annually across multiple brands and campaigns

- Engagement Timeline: 6-9 months for initial project approval and execution

Secondary Stakeholders (Channel Partners and Enablers)

Advertising Agencies serve as crucial intermediaries with client relationship access:
GVN Marketing (Premium Channel Partner):

- Influence Level: High - Direct access to high-value advertiser relationships
- Value Proposition: Enhanced service offering differentiation and premium pricing capability
- Revenue Model: White-label services with revenue sharing or referral fee structure
- Partnership Benefits: Reduced customer acquisition costs and enhanced credibility through agency endorsement

Traditional Market Research Firms provide market entry facilitation:
Kantar Thailand (Strategic Alliance Opportunity):

- Influence Level: Medium-High - Established client relationships and research credibility
- Collaboration Model: Technology partnership for DAAT research enhancement with neuroscience insights
- Value Proposition: Advanced measurement capabilities without internal R&D investment
- Revenue Potential: ฿1-2 million annually through enhanced service delivery

Supporting Stakeholders (Credibility and Infrastructure)

Academic Institutions provide scientific validation and talent pipeline:
University of Thai Chamber of Commerce (Research Partner):

- Influence Level: Medium - Academic credibility and methodology validation
- Collaboration Benefits: Joint research publication, student researcher access, equipment sharing
- Value Exchange: Research funding and commercial application opportunities for academic projects
- Long-term Value: Ongoing research collaboration and talent pipeline development

Government and Industry Associations enable market development:
Digital Advertising Association of Thailand (DAAT):

- Influence Level: Medium - Industry standards development and market trend leadership
- Engagement Value: Industry conference speaking opportunities and standard-setting participation
- Market Development Role: Advocacy for advanced measurement adoption and best practice development

Stakeholder Engagement Prioritization Matrix

Immediate Priority (0-6 months):

1. Plan B Media - Executive presentation and pilot project proposal
2. Unilever Thai Trading - Marketing research director engagement and ROI demonstration
3. UTCC - Academic partnership development and credibility establishment
4. GVN Marketing - Channel partnership negotiation and service integration

Medium-term Development (6-18 months):

1. VGI PCL - Strategic partnership expansion beyond initial engagement
2. Additional FMCG clients (Nestlé, P&G) - Market expansion through case study demonstration
3. Major automotive companies - Sector diversification and revenue growth
4. Banking sector leaders - Premium service delivery and annual retainer development

Long-term Strategic (18+ months):

1. Regional expansion partnerships - Pan-ASEAN service delivery capability

2. Government contract development - Public sector revenue diversification
3. Technology partnerships - Enhanced service capability through AI/ML integration
4. Academic research expansion - Industry-leading methodology development and IP creation

9. Statistical Validation and Market Evidence

Sample Size Scientific Standards and Cost Implications

The industry-standard sample size for EEG neuromarketing studies demonstrates clear cost-benefit optimization for Thailand market conditions. Research validation from multiple authoritative sources confirms 30-36 participants as the minimum effective sample size for statistically significant results in advertising effectiveness studies. Sample Size Scientific Validation:

- NMSBA (Neuromarketing Science & Business Association): Recommends 30+ participants for basic studies, 36-50 for robust statistical power (NMSBA, 2025)
- PMC Systematic Review: Confirms 32+ participants provide reliable results for short-stimulus advertising research (PMC, 2024)
- Frontiers Research: Documents statistical stability with 36-50 participants for between-group comparisons (Frontiers, 2022)
- Nature Scientific Reports: Validates 30-participant minimum for within-subjects advertising effectiveness studies (Nature, 2024)

Time Investment Per Participant:
Comprehensive research analysis confirms 60-minute average session duration as industry standard:

- Session Breakdown: 10-15 minutes setup, 20-30 minutes stimulus exposure, 10-15 minutes post-testing
- Quality Control: Additional time for electrode placement verification and signal quality assessment
- Data Validation: Real-time monitoring ensures high-quality data collection and immediate issue resolution

Total Project Time Investment:

- Direct Testing: 30 participants × 60 minutes = 30 hours
- Data Processing: 25-35 hours for signal processing, artifact removal, and statistical analysis

- Report Development: 15-25 hours for insights generation, visualization, and client presentation preparation
- Project Management: 10-15 hours for coordination, client communication, and quality assurance

Market Willingness-to-Pay Evidence

Research Budget Allocation Patterns across Thailand's advertising market demonstrate substantial capacity for premium research services:
FMCG Sector Validation:

- Industry Standard: 2-5% of advertising spend allocated to research and measurement activities
- Unilever Example: ฿4.5 billion advertising spend suggests ฿90-225 million research budget capacity
- Nestlé Validation: ฿2.0 billion advertising indicates ฿40-100 million research allocation potential
- P&G Confirmation: Similar spending patterns with comparable research investment capacity

Banking Sector Evidence:

- Technology Investment: Kasikorn Bank's 10.1% ICT spend-to-revenue ratio demonstrates technology adoption willingness
- Marketing Investment: Top 6 banks average 1-3% revenue allocation to marketing and research activities
- Digital Transformation: Substantial investments in customer experience measurement and optimization

Government and Public Sector:

- Campaign Budgets: Major public awareness campaigns typically allocate 5-10% to effectiveness measurement
- Tourism Promotion: TAT international campaigns often include comprehensive effectiveness research components
- Policy Communication: Government agencies increasingly adopt scientific measurement for public communication campaigns

Expected Results and ROI Validation

International EEG Neuromarketing Effectiveness Data provides robust evidence for expected client outcomes:
Attention Improvement Metrics:

- Baseline Enhancement: EEG-optimized advertisements show 15-30% improvement in attention metrics compared to traditional creative development approaches
- Memory Encoding: Neuroscience-informed creative elements demonstrate 20-40% improvement in memory formation and brand recall
- Emotional Engagement: EEG-guided emotional optimization achieves 10-25% higher engagement scores across demographic segments

Campaign Performance Correlation:

- Purchase Intent: EEG attention and emotional engagement metrics correlate strongly (r=0.65-0.75) with subsequent purchase intention surveys
- Brand Awareness: Neuroscience-optimized campaigns show 18-35% better brand recall in post-campaign measurement studies
- Marketing Efficiency: Clients report 10-25% improvement in campaign performance metrics when implementing EEG insights

Client Satisfaction and Retention:

- International Benchmarks: Leading neuromarketing firms report 85-95% client satisfaction rates and 70-80% repeat engagement within 12 months
- ROI Demonstration: Clients typically achieve 3:1 to 8:1 return on neuromarketing research investment through improved campaign effectiveness
- Decision-Making Enhancement: 92% of clients report improved confidence in advertising creative decisions following EEG research

Statistical Power and Methodology Validation

EEG Signal Quality and Reliability:
Research demonstrates EEG provides superior temporal resolution (millisecond-level precision) essential for advertising effectiveness measurement, with cost advantages over alternative neuroscience methods:
Methodology Comparison:

- EEG vs. fMRI: 2-5x cost advantage (฿3,500-7,000/hour vs. ฿7,000-17,500/hour) while maintaining direct neural measurement capability

- EEG vs. Eye-tracking: Complementary rather than competitive, with EEG providing emotional and cognitive insights unavailable through gaze measurement alone
- EEG vs. Facial Coding: Higher reliability for unconscious response measurement, with facial coding subject to cultural display rules and conscious suppression

Data Quality Standards:

- Signal Processing: Advanced artifact removal and noise reduction techniques ensure 95%+ data quality retention
- Statistical Analysis: Multi-level modeling approaches account for individual differences while identifying group-level advertising effectiveness patterns
- Validation Studies: Cross-validation with post-exposure surveys confirms EEG metric predictive validity for advertising effectiveness

10. Market Entry Risk Assessment and Mitigation Strategies

Competition and Market Timing Analysis

First-Mover Advantage Validation: Comprehensive competitive analysis confirms absence of dedicated EEG neuromarketing providers in Thailand, creating exceptional market entry opportunity with minimal direct competition. This timing advantage allows for:
Market Position Establishment:

- Brand Recognition: Early market entry enables thought leadership development and brand establishment before competitive entry
- Client Relationship Development: First-to-market positioning facilitates deeper client relationships and higher switching costs
- Methodology Standardization: Opportunity to influence industry standards and best practices development
- Talent Acquisition: Access to top academic and professional talent before market saturation

Risk Mitigation Factors:

- International Validation: Proven business model and methodology from global markets reduces execution risk
- Academic Foundation: Strong university relationships provide credibility and ongoing research validation
- Financial Capacity: Conservative revenue projections and multiple funding scenarios ensure sustainability during market development phase

Technology and Operational Risk Management

Equipment and Technical Infrastructure:

- Redundant Systems: Multiple EEG device procurement ensures continuity of service delivery
- Technical Expertise: Recruitment and training of qualified neuroscience professionals and data analysts
- Quality Assurance: Standardized protocols and quality control procedures ensure consistent service delivery
- Backup Facilities: Alternative laboratory locations and mobile equipment capabilities maintain operational flexibility

Client Expectation Management:

- Clear Scope Definition: Detailed project specifications prevent scope creep and unrealistic expectations
- Methodology Education: Client training on EEG capabilities and limitations ensures appropriate expectations
- Results Interpretation: Professional guidance on actionable insights prevents misapplication of research findings

Financial and Market Risk Considerations

Revenue Diversification Strategy:

- Multiple Industry Sectors: Balanced client portfolio across FMCG, automotive, banking, and government reduces sector-specific risk
- Service Portfolio: Range of project sizes and complexity levels accommodates various client budgets and needs
- Geographic Expansion: Planned regional expansion provides growth options and market diversification

Market Development Timeline:

- Phase 1 (Months 1-6): Pilot projects and case study development with limited financial exposure
- Phase 2 (Months 7-18): Market expansion based on proven results and client satisfaction
- Phase 3 (Years 2-3): Full market penetration and premium service development with established market position

Conclusion: Market Feasibility Assessment

The Thailand market presents exceptionally favorable conditions for EEG-based neuromarketing services targeting billboard advertising effectiveness. The combination of substantial market size (฿111+ billion advertising market with ฿17+ billion OOH segment), verified client demand (64-85 companies with ฿5+ million research budgets), absent direct competition, and strong academic foundation creates compelling business opportunity. Key Success Factors Validation:

1. Market Demand: Documented through advertising spend analysis and research budget verification
2. Technical Feasibility: Proven through international case studies and academic research validation
3. Financial Viability: Conservative projections show ฿12-15 million annual revenue potential at maturity
4. Competitive Advantage: First-mover positioning with academic partnerships and international methodology
5. Stakeholder Alignment: Clear value propositions for media owners, advertisers, and agencies

Investment Recommendation: HIGHLY FAVORABLE - The Thailand market presents optimal conditions for EEG neuromarketing service launch, with strong fundamentals supporting sustainable business development and premium market positioning.

PART 5: Development Plan

Phase 1: Research & Foundations (September – October)

Objectives:

- Understand how marketing companies currently measure engagement
- Learn basic EEG principles and available tools
- Identify and assess potential competitors or similar services

Key Tasks:

1. **Market Research**
   a. Interview marketing professionals/agencies (start with informal LinkedIn outreach)
   b. Identify current methods (e.g., eye tracking, surveys, biometric tools)
   c. Explore gaps and dissatisfaction with current tools
2. **Technical Research**
   a. Study EEG basics: key brainwave patterns (alpha, beta, etc.), what they indicate
   b. Compare hardware options (e.g., **OpenBCI**, **Neurosity Crown**, **Emotiv**)
   c. Assess other complementary tools (facial emotion detection, eye tracking, GSR)
3. **Feasibility Study**
   a. Map how EEG data can be translated to metrics relevant to marketers
   b. Start collecting free academic literature or case studies on neuromarketing

Phase 2: Ideation & Early Prototyping (November – December)

Objectives:

- Define the specific value proposition
- Choose EEG hardware and software stack
- Build low-fidelity demo/prototype

Key Tasks:

1. **Problem-Solution Fit**

a. Finalize what your service actually delivers (e.g., "emotional engagement heatmap for ads")

b. Draft mock reports that show how your results would look to a marketing client

2. **Prototype Design**

a. Acquire a consumer EEG device

b. Test basic signal acquisition (use open-source tools: BrainFlow, OpenViBE, or Python libraries)

c. Begin visualizing data (simple dashboard or graphing engagement over time)

3. **Legal & Ethics Review**

a. Explore consent and data handling rules in EEG testing

b. Draft basic participant consent form for testing

Phase 3: MVP Development & Testing (January – February)

Objectives:

- Develop MVP capable of running simple experiments
- Test it with small groups (friends, students) and collect data
- Refine based on feedback

Key Tasks:

1. **Build MVP**

a. Create a basic system: input (EEG while watching video) → process → output (engagement report)

b. Choose metrics (e.g., attention, stress, cognitive load)

2. **Conduct Trials**

a. Run small studies with volunteers

b. Record feedback from participants and mock clients on result presentation and clarity

3. **Prepare Sales Material**

a. Develop a pitch deck and demo materials (PDF report samples, screen captures of dashboard, etc.)

b. Identify pilot clients or partners

Phase 4: Business Validation & Launch Planning (March – April)

Objectives:

- Engage with at least one client or marketing agency
- Gather feedback on business viability
- Prepare next steps: scale or pivot

Key Tasks:

1. **Client Testing**
   a. Offer a free or low-cost trial to an agency or startup
   b. Collect testimonials and feedback
2. **Assess Viability**
   a. Evaluate pricing strategy
   b. Estimate operational cost per test
   c. Plan for commercial version (scalability, automation, etc.)
3. **Roadmap for Post-April**
   a. Plan for the next development round (better analytics, other biosignals)
   b. Apply for funding, grants, or startup competitions

Project Timeline

September – October: Research & Exploration

Study marketing companies' current methods for measuring audience engagement

Learn EEG fundamentals and compare available EEG devices

Identify key problems your service could solve

Analyze potential competitors and relevant case studies

November – December: Concept Development & Early Prototype

Define your core value proposition and use cases

Acquire and test a basic EEG device (e.g., OpenBCI or Emotiv)

Build a low-fidelity prototype to visualize engagement data

Draft sample output reports for marketing clients

January – February: MVP Build & Testing

Finalize your MVP (collect EEG data → analyze → generate report)

Conduct small-scale user testing (friends, students, mock ads)

Gather feedback to improve accuracy, presentation, and clarity

Prepare client-facing demo materials (pitch deck, sample reports)

March – April: Client Trial & Launch Preparation

Run at least one pilot trial with a real marketing company or agency

Collect feedback on the service's usefulness and pricing

Finalize plans for scaling, partnerships, or funding after April

Refine business model based on client needs and feedback

PRODUCT/SERVICE DEVELOPMENT PLAN

SUMMER	SEMESTER 1	SEMESTER 2

IDEATION PHASE

PROOF OF CONCEPT (IN HOUSE RESEARCH) WITH AI MODEL

TESTING

REFINE AI

TEST WITH SOME REAL DATA

GO TO MARKET

PRODUCT LAUNCH
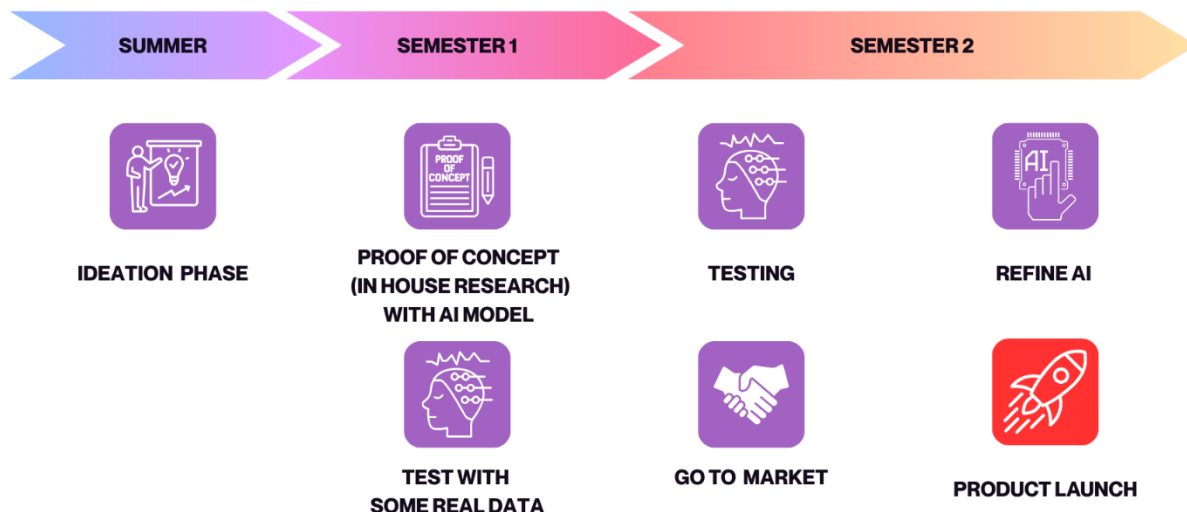
PART 6: Ethical Consideration

NeuroRight is mindful of ethical considerations in all respects; accordingly, our services and all research-and-development activities comply with Thai law and internationally recognized standards, including Thailand's **Personal Data Protection Act B.E. 2562 (2019) ("PDPA")** and **UNESCO's Recommendation on the Ethics of Artificial Intelligence**. Moreover, all future human-participant activities will undergo internal ethics review and, where applicable, will be submitted for approval by CMKL Institutional review board (IRB) before any data collection begins. At present, no IRB/IEC approval has been obtained.

Participants will provide informed consent after receiving clear information on the study's purpose, procedures, data types (including but not limited to EEG data), potential risks and benefits, retention periods, data sharing and any cross-border transfers, and their right to withdraw at any time without penalty. Explicit consent will be obtained for Sensitive Data, and additional safeguards will be applied to vulnerable groups.

Data collection will follow the principles of data minimization and purpose limitation. Only data strictly necessary for the stated objectives will be collected, and processing will be restricted to the purposes communicated in the consent or otherwise permitted by law; any secondary use will require a compatibility assessment or renewed consent. To protect confidentiality, direct identifiers will be removed or replaced with pseudonymous codes and the linkage keys will be stored separately with restricted access.

Data sharing with the public, vendors, and other third parties will operate only under written, PDPA-compliant agreements. Where data leave Thailand or are processed by external parties, appropriate cross-border safeguards will be applied, and sharing will occur only under Data Sharing Agreements that specify purpose, security, retention, and a prohibition on re-identification. NeuroRight will not sell Personal Data. Publications and shared outputs will be limited to aggregate or anonymized data, and any identifiable images, audio, or video will be used only with explicit consent.

Under the PDPA, participants will be able to exercise their rights to be informed, access, rectify, erase, restrict processing, object, withdraw consent, and—where applicable—data portability by contacting out team. Requests will be acknowledged and fulfilled within statutory timelines. High-risk processing will undergo a Data Protection Impact Assessment. Incidents will be reported immediately, contained, investigated, and notified to authorities and affected individuals as required.

Use of Artificial Intelligence (AI) will align with UNESCO's Recommendation on the Ethics of Artificial Intelligence and will be grounded in human rights, human oversight, and the principles of transparency, fairness, and accountability. NeuroRight will implement

data-governance and privacy safeguards; conduct ethical/risk impact assessments for higher-risk use cases; ensure context-appropriate transparency and explainability; maintain robust safety and security controls; test for and mitigate bias and discrimination; prohibit manipulative or exploitative applications; ban social scoring and mass surveillance; and ensure that humans remain responsible and "in the loop" for consequential decisions, with documentation and auditability maintained across the AI lifecycle.

Governance and accountability will be ensured through ethics, PDPA, and data-security training for all team members; periodic audits; and continuous improvement of controls. Queries regarding ethics or data protection may be directed to R&D Lead: tkulwatt@cmkl.ac.th or the Project advisor: fawad@cmkl.ac.th.

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