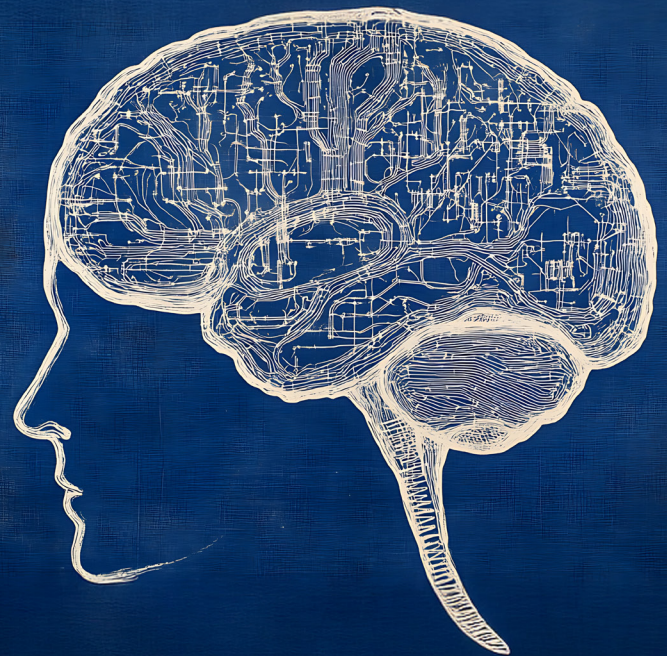


Research Findings

# NEUROTECHNOLOGY IN CORPORATE COMMUNICATIONS

Just a vision or on the verge  
of becoming a reality?

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Neurotechnologies are making inroads into the consumer market. Tech-savvy users as well as companies are exploring their applications across entertainment, education, and everyday life such as stress management and sports. By combining powerful hardware and software, these tools enable a non-invasive, direct interface between the brain and technology, allowing for real-time tracking of reactions and the delivery of feedback impulses. This article introduces these technologies and explores how communication departments can leverage them to optimize interactions with stakeholders and internal workflows while also addressing key challenges.



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## WHY THIS MATTERS NOW

Brain-computer interfaces, neuroimaging tools, and biometric wearables are now entering the consumer market. Headphones equipped with integrated sensors can non-invasively measure brainwaves to track users' attention and concentration (e.g., Neuroable, 2025; Neurosity, 2025) and even enable them to control software hands-free using only their thoughts (NeuroSky, 2025). Apple is currently developing AirPods capable of monitoring biosignals (Ravia & Hammer, 2024).

Initially limited to medical and research settings due to their complexity and cost, these technologies are now becoming more accessible, expanding their applications into everyday life and areas such as education, wellbeing, and stress management. This shift has sparked debates around their potential impact on business operations, particularly in strategic management and marketing.

Within strategic communication research, Nothhaft and Seiffert-Brockmann (2023) have initiated a conceptual debate on incorporating insights from mind science and evolutionary psychology. They argue that the rise of artificial intelligence (AI) makes it crucial to embrace a biological perspective on the human mind. Neurotechnological applications, however, have so far been largely overlooked in both academic and professional discourse, although some voices have recently begun to address the topic (Stieglitz et al., 2024). This motivated us to conduct a research project which systematizes current neurotechnologies and their capabilities in organizational settings and contextualizes them within communication management theory. A comprehensive interdisciplinary literature review and analytical reasoning allowed us to identify opportunities and use cases for enhancing both communicative interactions with stakeholders and internal processes in communication departments and agencies. The following sections present our key findings.

## WHAT ARE NEUROTECHNOLOGIES?

At its core, neurotechnology studies the mechanisms of the nervous system and encompasses a variety of devices and computational tools which can do the following:

- record **metabolic activity** in the brain;
- record **electrical activity** in the brain; or
- focus on **physiological activity signals** outside the brain.

According to UNESCO (2021), neurotechnology can be defined as

*“the field of devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of animals or human beings.”*

Neurotechnology enables the continuous observation of brain activity as individuals interact with their environment, for example to uncover emotions, attitudes, and preferences. It can also provide insights into cognitive processes such as focus and attention to optimize productivity, decision-making and wellness.

In addition, research suggests that neurotechnology may support improvements in memory and attention, although such applications are still largely in the research phase and confined to medical contexts. A team of researchers at Stanford’s Wu Tsai Neurosciences Institute recently made a breakthrough by using AI to replicate how the brain organizes sensory information.

This opens up new opportunities to study the dynamics of neural networks and test hypotheses about brain behavior independent of human subjects.

## Non-invasive neuro-recording methods

Method		Measures
Recording metabolic activity in the brain	fMRI (Functional magnetic resonance imaging)	Changes in brain blood oxygenation levels using magnetic fields and radio waves
	fNIRS (Functional near-infrared spectroscopy)	Changes in blood color due to changes in brain oxygen levels using near-infrared light
Recording electrical activity in the brain	MEG (Magnetoencephalography)	Magnetic fields around the brain and skull generated by neural electrical activity
	EEG (Electroencephalography)	Electrical activity of cortical brain areas
	TMS (Transcranial magnetic stimulation)	Causal links between brain regions and cognitive function by stimulating neural tissue with electromagnetic pulses
	SST (Steady-state topography)	Brain electrical activity in response to flickering visual patterns
Recording physiological activity signals	ET (Eye tracking)	Pupil dilation, number of blinks, eye position, gaze direction, and sequence of eye movements
	GSR (Galvanic skin response)	Sweat levels on the skin
	fEMG (Facial electromyography)	Electrical activity of facial muscles
	ECG (Electrocardiogram)	Electrical activity of the heart over time

From all methods, electroencephalography (EEG) builds the cornerstone of consumer neurotechnology and forms the basis of many commercially available devices, including Neurable (2025), Neurocity (2025), and NeuroSky (2025). It measures electrical signals through small electrodes/sensors in devices such as headbands and headphones, revealing cognitive and emotional states such as arousal, engagement, attention, memory, attitudes, preferences, decision-making, emotions, perception, motivation, trust, risk, and reward.

## POTENTIAL APPLICATIONS IN COMMUNICATION MANAGEMENT

When exploring potential applications of technology in communication management, it's important to differentiate between two scenarios: first, the enhancement of communication activities and processes (messaging and listening; campaigns and programs); and second, the enhancement of the management activities steering these processes, which may even involve redesigning communication departments more broadly.

## Examples of EEG application in the consumer market

- **Hyundai Motor Group:** Developed a brainwave-based driver monitoring system designed to reduce traffic accidents caused by drowsiness and driver inattention (Hyundai Motor Group, 2022).
- **L'Oréal:** Measured emotional and neural responses to different scents and identified fragrances that match individual preferences (L'Oréal, 2022).
- **SAP:** Explored an adaptive user experience (UX) to improve employee wellbeing and productivity by providing feedback on cognitive load, stress, and attention levels (EMOTIV, 2018).
- **Ikea:** Tested consumers in Poland and the Netherlands to understand their reaction to new business models (Furr et al., 2019)

## Contextualizing neurotechnology in communication management

### Contextual factors

Societal

Technological

Organizational

*Consideration of contextual factors associated with the implementation of neurotechnology.*

### Managing communication departments

People

Structure

Tasks

Technologies

*Applying neurotechnology to enhance the management of communication departments, benefiting leaders and team members.*

### Managing communication activities, campaigns, and programs

Analyzing

Planning

Executing

Evaluating

*Applying neurotechnology to enhance communication activities with stakeholders and internal clients.*

This means that neurotechnologies present opportunities to improve both communication activities addressing stakeholders or advising internal clients (e.g., top management) and the management of communication units including staff, workflows, etc.

However, fully leveraging these opportunities also requires the consideration of contextual factors. These include societal acceptance, ethical considerations, regulatory frameworks, technological availability and performance, as well as the economic costs and benefits associated with implementing neurotechnology.

### MANAGING COMMUNICATION ACTIVITIES, CAMPAIGNS, AND PROGRAMS

Communication management plays a pivotal role in guiding and executing communication activities. It ensures the alignment of corporate messages with organizational goals, stakeholder expectations, and societal norms. Potential use cases for neurotechnology can be identified in all steps needed for managing communications – analyzing, planning, executing, and evaluating:

- 1 **Analyzing:** This phase is used to collect and process data to examine the relationships between a company and its stakeholders – both internal and external – across markets and socio-political contexts, which is critical to all communication activities. Neurotechnologies can:
  - deepen the understanding of stakeholder perceptions and behaviors in experimental and real life settings to enable communication managers to develop more precise and effective strategies;
  - contribute to corporate reputation management by measuring unconscious responses of recipients to reputation signals such as advertisements or public statements;
  - refine stakeholder segmentation by revealing the emotional drivers and preferences that differentiate various groups.
- 2 **Planning:** This phase involves defining clear communication goals and systematically developing, evaluating, and selecting the most effective communication strategies. Neurotechnologies can:

- help with tailoring content and platforms to specific target groups, ensuring that messages resonate with audiences;
- simulate cognitive and emotional responses, allowing communicators to predict the potential effectiveness of their strategies, such as storytelling techniques or visual content, even before execution;
- measure cognitive load, allowing communicators to streamline messages and avoid overwhelming audiences, thereby enhancing message retention and engagement;
- provide insights into reactions to simulated crisis situations or predict stakeholder reactions, helping organizations anticipate potential risks or conflicts.

*Neurotechnologies present opportunities to improve both communication activities and the management of communication units.*

- 3 **Executing:** This phase involves turning the communication plan into action, from executing media campaigns to engaging directly with stakeholders in various settings, such as events and press conferences. While the widespread use of neurotechnologies for real-time tracking may be challenging due to the need for individuals to wear specialized equipment, smaller, more controlled settings – such as focused workshops, seminars, or VIP events – could offer a context for applying these technologies. Neurotechnologies can:
  - provide data for communication teams at events with immediate insights into how attendees are reacting to specific content, such as presentations, speeches, or product demonstrations.
- 4 **Evaluation:** This phase serves two primary functions: outcome evaluation, which measures whether the communication activities met their objectives, and process control, which ensures that the strategies remain aligned with organizational goals and are adapted to changes in the communication environment. Neurotechnologies can:

- allow for the tracking and assessment of the emotional and cognitive responses of stakeholders (both internal, such as employees, and external, such as customers) to various stimuli, such as messages, campaigns, or events;
  - reveal whether the messages are being received and how they are emotionally processed and cognitively evaluated to gauge the effectiveness of their positioning, branding efforts, or responses to social or political issues.
- improve cognitive functions like executive control, mental flexibility, attentional focus, and task engagement.

② **Structure:** The integration of neurotechnologies into communication departments can drive changes in the work environment, collaboration dynamics, and training practices. They can be used to:

- monitor the cognitive and emotional states of communication practitioners during meetings, providing insights into fatigue levels and engagement;
- tailor workspaces through lighting adjustments, ergonomic improvements, or personalized work schedules that align with team members' cognitive rhythms (also discussed under the term "neuroergonomics").

③ **Tasks:** Neurotechnologies can bring transformative changes to the way tasks in communication departments are structured, assigned, and managed by:

- matching tasks to each team members' cognitive capacity;
- adjusting tasks dynamically to ensure they remain challenging yet achievable, preventing disengagement or withdrawal;
- highlighting optimal moments for high-stakes decisions, ensuring they are made when communication practitioners are most focused and mentally prepared.

④ **Technologies:** Communication departments can improve their digital ecosystem (CommTech) by embedding neurotechnological insights into:

- the decision-making process in selecting digital systems (e.g., AI applications) that align with team requirements;
- competency development programs (e.g., to boost AI literacy among communicators) to improve information retention and ensure users feel confident in applying the technology.

## MANAGING COMMUNICATION DEPARTMENTS

Communication departments are specialized units responsible for managing, controlling, and executing communication activities across multiple channels and platforms. A widely recognized framework from the field of management information systems for analyzing technology use is the socio-technical systems (STS) approach. It has already been applied to research the digital transformation of corporate communications through CommTech (Brockhaus et al., 2023; Luoma-aho & Badham, 2023).

STS views any organizational unit, such as a communication department, as a system comprised of two interdependent subsystems: The social system is concerned with the attributes of people (e.g., attitudes, skills, values), their relationships, and the organizational structures that govern their work, while the technical subsystem encompasses the technology and tasks necessary to transform inputs into outputs (Bostrom & Heinen, 1977a, 1977b):

- ① **People:** Neurotechnological tools can help to understand the human information processing system and its intrinsic limitations, e.g., due to individuals' mental workload, interpersonal relationships, and professional development. They can help to:
- monitor the team members' stress levels in real-time;

**Exemplary use cases for neurotechnology in communication management**

Managing communication activities, campaigns, and programs			
Analyzing	Planning	Executing	Evaluating
Understanding stakeholder perceptions and behaviors	Developing communication campaign & programs	Event management	Adjusting and refining communication strategies
Optimizing corporate reputation management	Planning crisis communication		Evaluating events
Refining stakeholder segmentation			

**Neurotechnology applications**



Accumulating data on cognitive and emotional states of stakeholders



Tracking emotional and cognitive responses of stakeholders



Receiving data on stakeholder preferences



Assessing cognitive and emotional states of stakeholders



Simulating cognitive and emotional responses of stakeholders

Managing communication units			
People	Structure	Tasks	Technologies
Monitoring stress levels	Optimizing workflows	Enabling dynamic and responsive task management	Evaluating and adopting new tools
Improving cognitive functions	Redefining meeting formats		Adjusting training programs
	Optimizing physical and environmental conditions		

## KEY CHALLENGES

By enabling the access and manipulation of neural activity, neurotechnology offers unprecedented opportunities to understand and enhance human cognitive and emotional states. However, this access also poses risks to core human values and hold significant ethical implications:

- **Societal challenges** center on mental integrity, personal identity, autonomy, mental privacy, and broader ethical considerations. To address these, the concept of “neurorights” has emerged, proposing a legal framework to protect mental privacy, agency, and identity. Although this framework is still in its early stages, its adoption could help communication professionals implement neurotechnology ethically.
- **Technological challenges:** Rapid technological advancements can result in the obsolescence of systems, requiring constant updates or replacements to stay competitive. Another critical issue with neurotechnology is the variability in the accuracy and interpretability of its results as well as often opaque algorithmic systems and lack of transparency. The reliability and interpretability should be considered carefully to avoid flawed decision-making in communication management, such as misinterpreting audience responses.
- **Organizational challenges** range from logistical and financial hurdles to employee acceptance. Advanced neurotechnology systems are still expensive, requiring significant investment in specialized equipment, ongoing maintenance, and staff training. Additionally, the time required to integrate these tools into existing workflows, build expertise, and generate actionable results may delay the return on investment. The successful implementation of neurotechnology depends on its acceptance by practitioners working in communication departments and stakeholders alike. Clear policies and transparent communication are essential to avoid resistance from a lack of understanding how personal information will be used and from fear of misuse (“neurosurveillance”).

## OUTLOOK

Although neurotechnology may be several years away from becoming an integral part of communication management, it’s wise to begin exploring its potential now. Our study contributes to the scientific and professional understanding of how the interactions between the human body, mind, and technology can be used to enhance communication processes. However, its adoption must be approached with caution to ensure that human values and ethical standards are upheld. Clear policies are essential to regulate its use, prioritizing transparency, data protection, and ethical boundaries to responsibly integrate neurotechnology into professional practice.

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## RESEARCH PROJECT



**Study details:** This research project was funded by the Academic Society for Management & Communication to explore the trend “Decoding Humans” identified in the Communication Trend Radar 2024 (Stieglitz et al., 2024) in more depth. The full results were reported in a peer-reviewed conference paper in spring 2025 (available on request from the authors).



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