Anti-Fatigue ∞ Anti-Aging Total Repair Subcommittee

~ Measuring and Designing Fatigue Recovery and Health Repair Through Science ~

Meaning of ∞ (Infinity)

Fatigue and aging are not separate issues. Rather, they exist in a reciprocal relationship in which the accumulation of fatigue accelerates aging, while the decline in recovery capacity associated with aging further increases fatigue.
By designing anti-fatigue and anti-aging strategies simultaneously and continuously, the human body's intrinsic capacity for recovery and repair can be enhanced in a synergistic manner.
The symbol ∞ (infinity) represents this continuous and interconnected cycle—one in which these processes remain dynamically linked without interruption.

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BiocK
Biocommunity Kansai

1. Concept of the Subcommittee

This Subcommittee aims to move beyond conventional symptomatic approaches to fatigue and aging by exploring how human functional decline can be comprehensively addressed through the concept of **Total Repair**. Rather than treating anti-fatigue and anti-aging as separate domains, it redefines functional deterioration as a result of interactions among the body, brain, behavior, and environment.

Fatigue and aging are viewed not simply as decline, but as processes driven by accumulated micro-level stress and insufficient repair. By integrating medicine, neuroscience, behavioral science, environmental engineering, and data science, the Subcommittee seeks to scientifically identify and quantify states in which repair mechanisms fail to keep pace.

Total Repair refers not merely to restoration, but to designing conditions that continuously support intrinsic self-repair capacity through exercise, nutrition, sleep, cognitive stimulation, social participation, and spatial environment design. This concept extends beyond individuals to organizations, spaces, and urban systems.

Through demonstration projects in workplaces, residential settings, and healthcare environments, the Subcommittee aims to build reproducible models that promote repair before functional decline becomes visible. Ultimately, it seeks to establish a society designed around continuous repair—contributing to longer health span, sustainable performance, and the development of next-generation anti-fatigue and anti-aging industries.

2. Flagship Project: “Urban Anti-Fatigue & Anti-Aging Project”

A Social Implementation Model Where Citizens Can Naturally “Recover” Through Biotechnology × Urban Design

[Purpose]

This project redefines urban spaces and everyday living environments as **“Rejuvenation Hubs”** that naturally restore and activate mental and physical functions. By integrating the Kansai region’s advanced capabilities in biotechnology and medical research with design expertise, it aims to create a social implementation model in which citizens can benefit from these effects without conscious effort.

Rather than pursuing a city that merely avoids fatigue, the project designs a new urban paradigm that assumes the presence of daily stress and embeds rapid and stable recovery capacity as a core urban function itself.

Rejuvenation Hub

The urban environment itself is redefined as a **“recovery system,”** optimizing infrastructures such as parks, offices, and transportation hubs into spaces equipped with health-enhancing functions.

Unconscious Health Benefits

Rather than requiring individuals to consciously strive for health, this approach creates a **nudge-based environment** where simply living and working naturally enhances bio-resilience.

Non-Invasive and Non-Restrictive

Invasive procedures such as blood sampling and restrictive examinations are minimized wherever possible. By utilizing wearables and environmental sensors, states of **“repair deficiency”** are detected early within the natural flow of daily life.

Standardization and Scalability

Through co-creation among corporations, local governments, and research institutions, recovery indicators (**K-Bio Age**) are standardized to enable broad-scale deployment beyond a single model.

3. Three Strategic Activities

Establishment of a Visualization Platform for "Repair States" in Urban Environments

■ **Transforming Cities into "Measurable Repair Systems"**

[Definition]
This initiative establishes an urban measurement platform that visualizes repair states across people, places, and time by interpreting fatigue and aging as the progression of **repair deficiency**. Targeting urban spaces, daily activities, and work environments, the platform enables non-invasive and non-restrictive monitoring and visualization at the city scale.

[Role as an "Anti-Fatigue × Anti-Aging" Total Repair Hub]
•Integrates wearable data, environmental sensors, and behavioral data to structurally identify urban conditions that hinder or promote repair.
•Generates repair-deficiency maps based on urban, spatial, and lifestyle conditions rather than individual-level evaluations.

Demonstration of "Minimal Total Repair Interventions" at an Urban Scale

■ **Verifying What Truly Drives Repair in Urban Environments**

[Definition]
This initiative conducts small-scale demonstration projects using distributed urban spaces, services, and environmental elements to examine how far repair processes can be activated through **minimal interventions**.

[Role as an "Anti-Fatigue × Anti-Aging" Total Repair Hub]
•Validates combinations of advanced biological insights—such as NMN and autophagy—with spatial and behavioral design.
•Establishes repair models that avoid excessive intervention and do not rely on medical treatment.
•Accumulates reproducible knowledge, including both success and failure conditions.

Establishment of a Design Model for Urban Environments Where Repair Occurs Naturally

■ **Toward Urban Structures Where Recovery Progresses Without Individual Effort**

[Definition]
This initiative models a design philosophy that embeds conditions conducive to repair directly into urban elements—such as spatial layout, movement flows, time structures, levels of stimulation, and places of stay—so that recovery does not depend on individual effort.

[Role as an "Anti-Fatigue × Anti-Aging" Total Repair Hub]
•Extracts design principles applicable across offices, housing, stations, parks, and commercial facilities.
•Enables environments where recovery occurs naturally through the urban setting itself, rather than through individual effort.
•Develops design guidelines applicable to urban planning, real estate development, and public spaces.

4. Anti-Fatigue Total Repair Hub

◇ What is the Anti-Fatigue Total Repair Hub?

The **"Anti-Fatigue Total Repair Hub"** serves as a demonstration and design platform aimed at redefining urban environments, workplaces, and living spaces as social infrastructure where human mental and physical functions can naturally recover and repair.

In modern society, accumulated fatigue and functional decline have become structural challenges that cannot be solved solely through individual effort or lifestyle improvement. High-density urban environments, information-intensive work conditions, and fragmented daily rhythms themselves often inhibit the body's intrinsic capacity for recovery and repair.

This platform clearly distinguishes between **"recovery,"** referring to short-term restoration, and **"repair,"** referring to the mid- to long-term correction of accumulated strain. It integrates environmental factors, human behavior, and biological responses to design and validate conditions under which these processes occur naturally within everyday life and work. Rather than focusing on medical intervention or individual self-management, the platform targets the underlying conditions that enable recovery and repair to emerge as natural outcomes.

Knowledge generated through demonstrations across cities, offices, residential environments, and care settings is translated into evaluation frameworks and systems applicable to architecture, urban design, and public policy.

The platform does not directly conduct implementation itself; instead, it functions as a cross-disciplinary core that oversees what should be measured, why it matters, how it should be measured, and how outcomes can be applied in society—providing the foundational infrastructure for realizing cities where people continuously recover and repair.

5. Data Philosophy and Handling within the Subcommittee

(1) Characteristics of Data Collected and Accumulated in the Subcommittee

Characteristic 1: Data on Recovery and Repair Processes — Not Disease Data
The data handled within this Subcommittee are not medical data centered on diagnoses or disease information. Instead, they are designed to capture how human functions are affected, depleted, and subsequently recovered or repaired within everyday life, work, and environmental contexts. Specifically, the data include combinations of physiological and behavioral indicators—such as activity levels, sleep, and heart rate variability—together with simple cognitive and behavioral metrics, as well as lifestyle, work-related, and spatial environmental data. These are used to understand whether recovery and repair processes are functioning smoothly or becoming stagnant.

🚀 The key characteristic is that the data do not define or diagnose individual health conditions; rather, they are used to identify conditions under which recovery and repair are more or less likely to occur.

Characteristic 2: Value Emerges Through Integration, Not Through Isolated Metrics
Data within this Subcommittee do not lead to conclusions when viewed as single values or independent indicators. Instead, multiple data sources are integrated within the **Health Function®** evaluation framework, enabling structural insights such as which lifestyle conditions promote recovery and repair, or which environmental factors hinder them.

🚀 These data are not intended to judge what is "good" or "bad," but to generate design insights and opportunities for improvement.

(2) Basic Principles of Data Management

Principle 1: Data Will Not Be Handled in a Personally Identifiable Form
Personally identifiable information will not be included in data used for analysis or sharing within the Subcommittee. As a general rule, only anonymized, aggregated, or processed data will be utilized. Data will not be used in ways that disadvantage individual participants, specific companies, or particular facilities.

Principle 2: Purpose Limitation and Phased Use
Data will be used strictly within the defined objectives of the Subcommittee, such as identifying repair deficiencies, validating recovery and repair models, and organizing environmental design principles. Use beyond these purposes or secondary use will not occur without separate agreement. In other words, data will never be repurposed without explicit consent.

Principle 3: Clear Separation Between Competitive and Non-Competitive Domains
Proprietary technologies, know-how, and unpublished information belonging to individual organizations are excluded from shared data. The Subcommittee focuses only on shareable, industry-level structural knowledge related to recovery and repair, ensuring that a common foundation can be built without compromising competitive advantage.

Year 1: *"Making It Visible"*

The first year focuses on establishing a system that objectively captures where and how recovery and repair processes are stagnating, moving beyond subjective sensations or perceptions of fatigue and aging. Pilot data will be collected in selected companies, facilities, and communities to identify environments where recovery and repair function well versus those where they tend to stagnate. The primary goal at this stage is not to define a single correct answer, but to create a shared framework and common metrics that enable consistent dialogue.

Year 2: *"Verifying What Truly Works"*

The second year examines whether recovery and repair can be improved through small, practical adjustments rather than large-scale interventions or medical treatments. For example, changes in work styles, spatial usage, or ways of resting will be compared to observe how recovery and repair conditions shift. The objective is to identify multiple practical models that are feasible in real-world settings and sustainable without imposing additional burden.

Year 3: *"Translating into Social Implementation"*

In the final year, accumulated findings are consolidated into formats that can be directly utilized by companies, local governments, and urban development stakeholders. The aim is to present guidelines and evaluation frameworks that enable environments where simply living and working naturally support recovery and repair—without relying on individual effort alone. Ultimately, the成果 are intended to inform future policy, urban design strategies, and new perspectives on real estate value.