Turning Serendipity into Planned Happenstance

Keisuke Goda - Program Manager (PM)

2001: B.A., physics, University of California, Berkeley
2007: Ph.D., physics, MIT
2007-2012: Researcher, University of California, Los Angeles
2012-Present: Professor, University of Tokyo
2014-Present: ImPACT Program Manager

Profile
World-class leader in photonics and multidisciplinary research. Young professor at University of Tokyo working on the development new research fields, industries, and new values. Selected as a World Economic Forum young global leader. Ph.D. in physics.

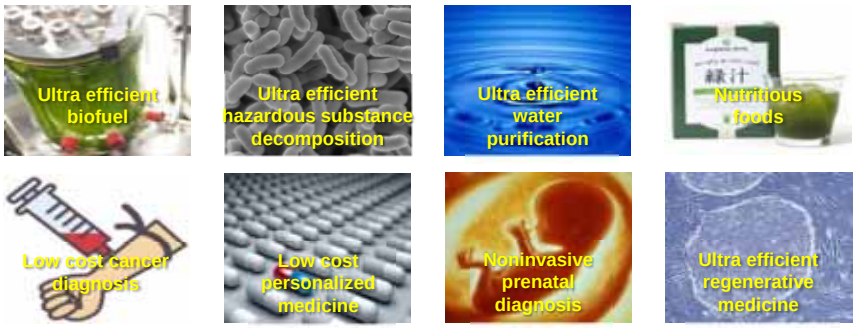
The Challenges for the PM and the Impact of Success

✓ Overview and background

Natural science is a field of study which seeks to clarify the laws of natural phenomena, and this is premised on the necessity of the reproducibility of the phenomena being studied. Conversly, natural science research to date has only studied easily reproducible phenomena and industrialized the related applied technologies. On this program, we shine light on natural aspects that we have overlooked so far, in an innovative attempt to industrialize it. Specifically, we will develop innovative basic technologies for systematically achieving serendipity (accidental lucky discovery), to quickly and accurately discover and analyze “the needle in the haystack” in life science.

✓ Impact on industry and society in the event of achievement

The tehnology to be developed will bring about a qualitative transformation of green innovation and life innovation, creating new industries and establishing a truly sustainable society.



Disruptive Innovation

✓ Keys to breakthrough

With conventional technology, the traits of cells are irretrievably buried in statistical data on traits. By finding and analyzing these traits with this technology (serendipiter), we can efficiently discover useful cell capabilities and unknown phenomena.

Scenario for Success and Achievement Targets

✓ Approaches

Develop a miraculous serendipitor (a device that systematically performs serendipity) that discovers and rigorously analyzes rare but valuable cells from an enormous cell population (of 1 trillion or more), quickly, accurately, at low cost and minimally invasively. Achieve the goal through a multidisciplinary effort involving the different knowledge and technologies of top class researchers from Japan and overseas in the fields of photon science, electronics, mechanical engineering, computer science, molecular biology, genetic engineering and so on.

✓ Management strategies

Implement research and development using the “elementary particle detector development” strategy. Develop various subsystems at various research institutions and build an integrated system (detector) by integrating the subsystems at the integration site. Minimize the risks of the program overall without relying on specific technologies.

✓ Achievement Targets

Establish start-ups at an early stage in order to create new industries and smoothly obtain intellectual property and achieve technology transfer. During the course of the program, achieve ultra efficient biofuel and high precision blood testing technologies as major implementation examples of this new concept.

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Overall R&D Program

Project 2
Development of basic technologies for **stimulating** cells accurately at high speed in single cell resolution

Project 3
Development of basic technologies for **measuring** cells accurately at high speed in single cell resolution

Project 4
Development of basic technologies for **identifying** cells accurately at high speed in single cell resolution

Project 5
Development of basic technologies for **fractionating** cells accurately at high speed in single cell resolution

Project 6
Development of basic technologies for **analyzing** cells accurately at high speed in single cell resolution

Life science "elementary particle testing"

Project 1
Development of the foundation for an integrated system (serendipiter)

Project 7
Integration of the various component technology in a basic system and development of a serendipiter

Project 8
Evaluate **ultra efficient biofuel development** using single cell organisms

Commercialization
Establishment of start-ups, global development, international standardization

Project 9
Evaluation of **high precision blood testing technology** for medical applications

Features of the program

- ✓ A unique cell detector with top class performance
- ✓ Create systematic serendipity, hitherto restricted to trial and error search
- ✓ Establish a platform that regularly produces Nobel-class discoveries
- ✓ Basic research and development with a strong focus on industrialization from the start

Total R&D Program Cost
JPY3.0 billion

* May increase/decrease depending on development progress
* Expenses required for PM activities and support will be provided as a separate allowance.

Implementation Organization

Program Advisor
Commercialization supervisor
Takuro WAKABAYASHI, ASTEC

Program Manager
Keisuke GODA, JST

Program Advisor
Public relations supervisor
Hiromi YOKOYAMA, Tokyo University

Assistant PM
R&D supervisor
Shinya KUREBAYASHI, JST

Team U45
+ several overage people

Projects 2 to 6
Subsystem development
UTokyo, Osaka Univ., Kyoto Univ., Chiba Univ., NAIST, Columbia Univ., Euglena Co. Ltd., public recruitment

Project 8
Evaluation of biofuel
Kyushu univ., Keio univ., public recruitment

Projects 1 & 7
Systemization
UTokyo, UCLA

Project 9
Evaluation of blood analysis
Tohoku University Hospital, Tokyo University Hospital, public recruitment

✓ Keys of the implementation organization

Selection by nomination of global top class researchers from academia and industry in the fields of photon science, chemistry, electronics, mechanical engineering, computer science, molecular biology, genetic engineering and so on (about 2/3 of the whole). Recruit outstanding researchers through public invitation (about 1/3 of the whole). The overall organization consists of young researchers under 45 with several overage researchers. Rather than emphasizing past records, focus on potential, multidisciplinary ability, global PR skills, and people skills. Form each project from three to six teams (developing different technologies), operating on competitive principles using the stage-gate method.

✓ Approach to selection of institutions

Rather than emphasizing the prestige of the research institution, nominate researchers from Japan and overseas with abilities for best achieving the goals (the remainder by public invitation).