Program Manager

Kanako Harada

2001 Received M.E. from Graduate School, The University of Tokyo
2001-2004 Hitachi Ltd.
2005-2007 Japan Association for the Advancement of Medical Equipment
2007 Received Ph. D. in Engineering from Graduate School, Waseda University
2007-2010 Postdoctoral Research Fellow, Scuola Superiore Sant'Anna, Italy
2010-2012 Project Assistant Professor, Graduate School of Engineering, The University of Tokyo
2012- Project Lecturer, Graduate School, The University of Tokyo
2015- ImPACT Program Manager
2016- Associate Professor, Graduate School, The University of Tokyo

Profile

Spanning research experience at universities, industry, hospitals, and abroad, her unique career has also involved work related medical equipment review and standardization. With management experience in international projects concerning machine tools and robots, Prof. Harada aims to return the benefits of research to society at large.

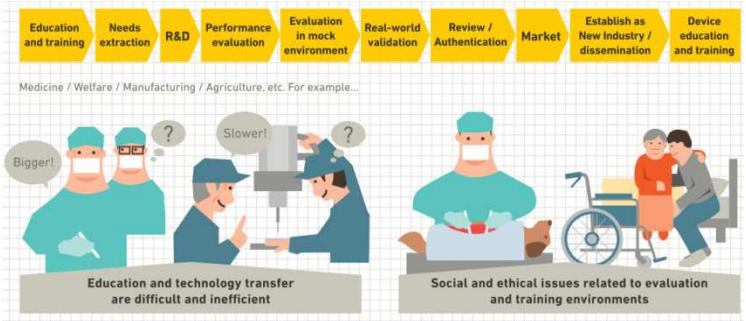
The Challenges for the PM and the Impact of Success

✓ Overview and background

- It takes time for seeds of innovative technology to be brought into actual application and reach the public.
- The process of research and development, evaluation, education, and training for equipment that affects human beings, in particular, involves many qualitative **sensory expressions,** requires **trial and error**, and is **inefficient.**
- By creating an elaborate imitation equipped with sensors that can be used in place of the real thing, qualitative sensory expressions can be understood quantitatively, trial and error can be reduced, and the process can be accelerated. The **Bionic Humanoid** will be developed as an elaborate model of a human body equipped with sensors, providing a successful example of this concept.

✓ Impact on industry and society in the event of successful achievement

- It will realize **quantitative, ethical, efficient** research and development, evaluation, education, and training, and it will accelerate innovation.
- The concept and the elements of technology will be widely deployed in industry, bringing about a new industrial revolution.



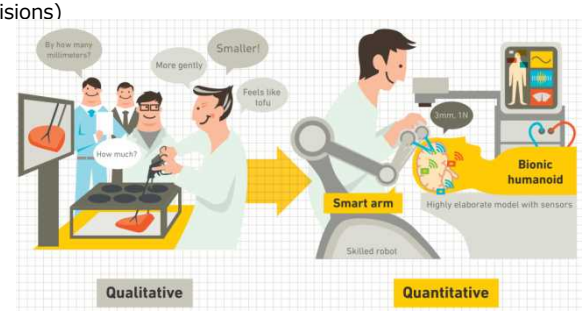
Disruptive innovation

✓ Key Points that Become Breakthroughs

Start the **challenge in medicine**, where the social impact is great

✓ As a platform that can be used in place of humans and experimental animals:
  - The **Bionic Humanoid** as an Elaborate Model of a Human Body Equipped with Sensors

✓ As the material realization of a social revolution brought about by deploying seeds of innovative technology:
  - Deployment of seeds: Skilled robot **Smart Arm**
  - Medical revolution: Ultra-precise treatment through small openings (nose or incisions)



The deployment in society of seeds of innovative technology by utilization of elaborate models equipped with sensors will also be conducted outside medicine and so bring about a social revolution, and a new industrial revolution.

Scenario for Success and Achievement Targets

✓ Methods of resolution leading to achievement (approach)

- Bring together top world-level researchers in measurements, processing, materials, and robots to break through technical barriers. Pursue prompt collaboration with scientific societies in medicine and medical equipment as well as with standards organizations to overcome time and institutional barriers.

✓ Management strategies

- Set targets that cannot be achieved without close joint research by the participating institutions.
- Technology development that is certain to succeed is assigned to major corporations, while the challenging development is assigned to universities and small to medium-sized enterprises.

✓ Achievement Targets

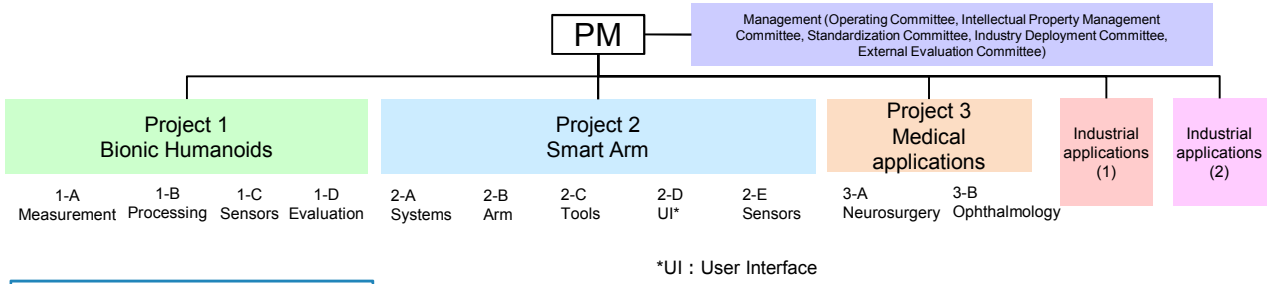
- Develop a Bionic Humanoid that uses artificial materials to precisely recreate the structure of the head, in particular (membrane of 3-600 μm thickness, etc.).
- Develop a Smart Arm (operates with repeated positioning accuracy of 10 μm and delay of less than 100 ms), conduct simulated surgery with it, and show the possibility of a revolution in medical care.

✓ Risks

- Taking the time risk of standardization and commercialization of results achieved, aggressively promote deployment in industry as elements of technology.

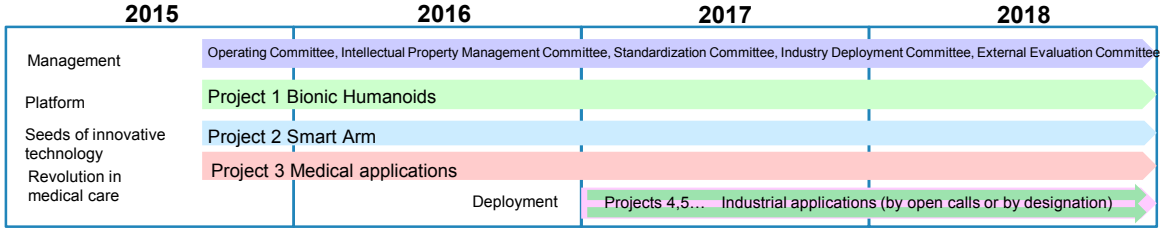
Bionic Humanoids Propelling New Industrial Revolution

Overall R&D Program Structure Created by the PM



*UI : User Interface

Implementation timeframe for each issue to be overcome



Project 1 Bionic Humanoid
Measure the characteristics of internal organs that are subjects of qualitative sensory expressions, and recreate them using artificial materials with embedded sensors

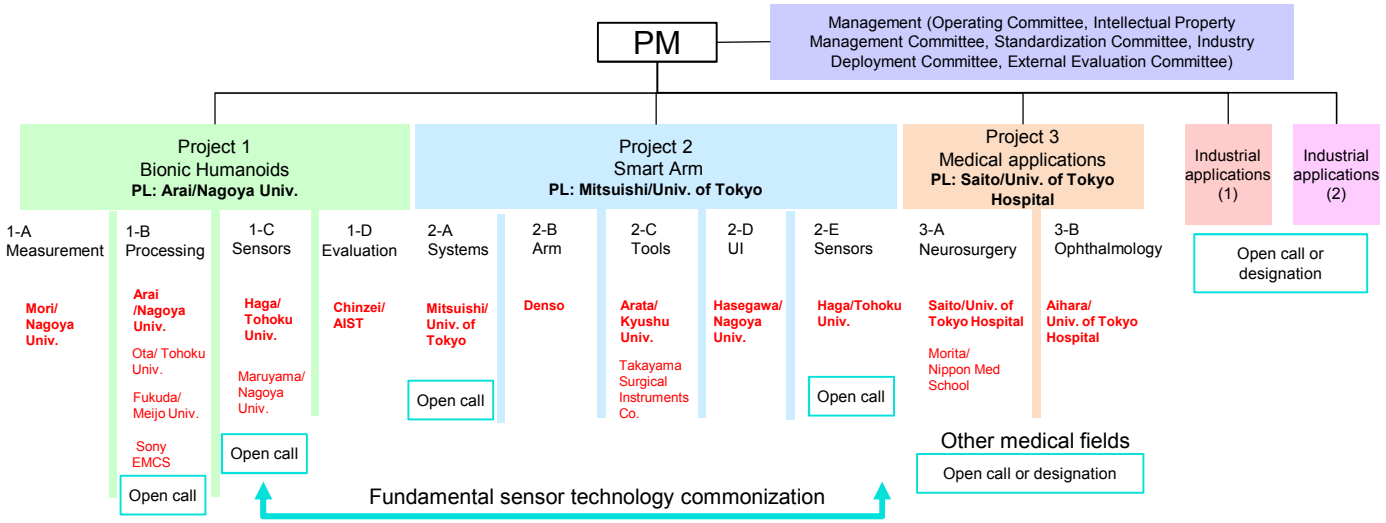
Project 2 Smart Arm
Using industrial robots arms as a base, develop a safe, intelligent, skilled robot that can be used close to people.

Project 3 Medical applications
Providing samples, etc., evaluating and using prototypes

Projects 4,5- Industrial applications
Industrial applications by open calls or by designation

Total R&D Program Cost
¥1.5 billion

Implementation Structure as Assembled by the PM



Red letters: System required at starting stage; **Bold:** Group leaders *UI : User Interface

✓ Keys of the Implementation Structure

- Close collaboration with engineering researchers, physicians, and corporations.
- Hold management meetings with small numbers of participants, the main participants being the PM, Assistant PMs, and PLs, to conduct fast, flexible decision-making.

✓ Approach to selection of institutions

- Designation without open call: Designate by name those institutions that possess the world's most advanced technology and will provide a powerful driving force.
- Designation by open call: Canvass widely for ideas by open calls regarding new needs, and engage appropriate research institutions.