Executive Summary

(Why “Robot Revolution” Now?)

From the 1980s onwards, Japan continues to maintain its status as “Robotics Superpower” in various aspects such as robot production and utilization with focus on the manufacturing field which Japan boasts to the world.

At the same time, Japan is seeing low birth rate and the aging of the population at a speed unprecedented in the rest of the world, and consequently Japan becomes an advanced country of challenging issues that, before any country else, face issues such as the decrease of the productive-age population and the expansion of social welfare spending. To cope with these issues, there is an increasing possibility to utilize robots.

On the other hand, recently in both developed countries such as Europe and America and emerging countries such as China, there is a renewed interest in robots as a key to growth, and they are rapidly catching up Japan, so that projects led by their governments are starting one after another.

In the background of the new international competition about robots, there is a full-fledged advent of the IoT age where digital data and virtual networks play a central role. In this competition, huge amount of data collected through practical and specific utilization of robots will serve all the more as a driving force for advancement of robots in data-driven innovation era.

In such a worldwide trend, our country has a big potentiality of making utmost use of the advantage of having both robot technology cultivated so far and fields requiring issue solved by robots, taking a step toward a new industrial revolution with robots being the core, and achieving actual issue solving one by one ahead the world.

(Goals to be achieved by “Robot Revolution”)

Robot revolution refers to:

1) turning what used not to be positioned as robot in conventional manners into robots through the advancement of sensor and AI technologies (eg. automobile, household appliance, mobile phone or housing will be considered a type of robots.);
2) utilizing robots in the actual site of manufacturing as well as various scenes of daily life which will lead to;
3) forming a society where new added value, convenience and wealth are created through the reinforcement of global competitiveness in the field of craftsmanship and service as well as settlement of social issues.

Currently, robots themselves are drastically changing under their feet. This can be represented by three key phrases: “being autonomous,” “functioning as an information terminal” and “being networked.” In addition to evolving from simple working robots into robots that can autonomously learn and act, they are becoming a new service source that autonomously accumulates and uses data, and such robots are increasingly collaborating with each other. Technological progress toward this direction is rapidly advancing.

It is also necessary for our country to reform our robots in light of such an international trend. First, it is necessary to transform them into robots capable of flexibly responding to requests in various fields by realizing “easy-to-use” robots that anyone can use well. To achieve that, it is necessary to pursue technological development and environmental improvement so that modular-type robots for responding to various needs through combinations of different modules under a common platform will become the mainstay.

It is also necessary to further transform such robots into next-generation robots capable of autonomously and interactively accumulating and utilizing data by being fused with IT.

As a result, the robots will serve as a souse for creating new added values in the fields of manufacturing and services, and can become a key device that will drastically change our life from entertainment to everyday communication by having a function for delivering various information and contents to people.

In the meantime, it is necessary to transform our society and system into those where we can make the most of the new robots, and it is also essential to realize a “robot barrier-free society” that fulfills the prerequisites for realizing a society where humans and robots coexist and cooperate with each other on a daily basis.

(Three pillars for the realization of the robot revolution)

For the realization of the robot revolution, we must pursue: (1) “Drastic enhancement of the robot creating capability” with Japan serving as the global robot innovation base, (2) “utilization and popularization of robots (robot showcasing)” for realizing everyday life where robots can be found in every corner of Japan with the aim of achieving the world’s best society of robot utilization, and (3) “global development and expansion of the robot revolution” aimed at expansion to more extensive fields in addition to acquisition of rules and international standards for pursuing businesses on the assumption that robots are mutually connected and autonomously accumulate and utilize data, as the three pillars.

In addition, Japan press ahead with a robot project worth JPY 100 billion through solicitation of private investments in robot development by making full use of multiple pump-priming policies ensuring systematic and environmental readiness through regulatory reform by the government..

(1) Drastic enhancement of robot creativity

Toward enhancement of robot creativity, establish first a “Robot Revolution Initiative” involving a wide range of industrial, academic and governmental stakeholders as a powerful nucleus for overall robot revolution. There, promote matching between needs and seeds in the project, acquisition of global standards, response to security and global cooperation, and so on.

As an innovation creating site, implement environmental preparations and human resource development for demonstration tests to try effective use of new robot technology. Specifically, establish a “Fukushima Hamadori Robot Demonstration Area” (tentative name) in Fukushima Prefecture as one of demonstration fields to become a robot development base in the ground, underwater and airborne fields. Also, through expansion of practical opportunities to create and make use of new robots, enhance development of IT human resources in a drastic manner, centering on system integrators and software which become the core in assembling robot systems.

Furthermore, promote development of next-generation technology so that Japanese robot technology may remain to be cutting-edge and keep prevailing over the years to come. Particularly, enhance research and development as to core technology (AI, sensing and recognition, drive and control) for the robots capable of playing an active role in a data-driven society, and at the same time, address normalization and standardization associated with coordination among devices, such as software including middleware (robot operating systems) eyeing global expansion, and interfaces and communications.

(2) Utilization and polularizationof the robots (robot showcasing)

Identify five fields of manufacturing, service, nursing and medical care, infrastructure and disaster preparedness construction and agriculture, where improvement of value added and drastic enhancement of productivity can be expected throughout Japan through promotion of utilization and effective use of the robots, and set strategic goals (KPI) to be materialized by 2020 for each field. Fix action plans for materializing the goals and make efforts to realize a strategy by intensively mobilizing policy resource during a period of up to 2020.

Specifically, the following approaches will be executed.

- In the areas of manufacturing and service, we will utilize system integrator and support the installation in a various fields as well as launching such incentive measures as selection and announcement of 100 best practice showcases of service robots. In addition, we will press ahead with the development of such robots as “Easy to Use” ones adapting flexibly to a wide range of needs. Employment of robots will be encouraged in the processes of scheduling and assembly in manufacturing, logistics in the service industry, and backstage works in the food and beverages, and accommodation industries in order to double the market size in the manufacturing industry (from JPY 600 billion to JPY 1.2 trillion), twenty times in the non-manufacturing industry (from JPY 60 billion to JPY 1.2 trillion) while raising the labor productivity by more than 2% at the same time by 2020.
- In the areas of nursing and medical care, we will go ahead with the development of devices to be utilized in the key areas of nursing care robot development (transfer aids, mobility aids, toilet aids, or monitoring systems as well as bath aids) while promoting employment of these nursing care robots through such incentives as enhanced flexibility in the application for additional nursing care covered under the public insurance system, or establishment of a foundation financing workplace infrastructure development in nursing care facilities. We aim at achieving a market scale of worth JPY 50 billion by 2020 for nursing care robots while reducing high risks of backache of nursing-care providers caused when assisting in relocation of patients by use of nursing care robots. In the area of medical care, we will accelerate review of brand-new medical devicess as well as providing support for more than 100 medical-related equipments utilizing robot technology to be put to a practical use within five years by 2020.
- In the areas of infrastructure, disaster preparedness and construction, we will advance technology development catering to on-site needs while carrying out “model projects” utilizing robots under the government initiatives. We will also take such incentive measures as planned deployment of robots for specific purposes by public bodies which are hard to be possessed by private sectors. In addition, we will set out policies on effective and productive usage of promising robots based on the results of on-site verification as part of structural reviews on infrastructure inspection and other relevant matters. We will enhance utilization of robots by 2020 by attaining the popularization ratio of 30% in the area of informatization technology and 20% for key and aging domestic infrastructures.
- In the agricultural and food industry, we will focus on research and development, and verification of on-site employment of automated tractors and other agricultural machinery operating at night or simultaneous operation of several machinery, as well as

mechanization, automation and robots applied in labor-intensive areas counting mainly on human resources at present (loading and unloading of crops, weeding, planting and nurturing forests, cleaning of marine farming nets and vessel bottoms, setting of lunch boxes, automated milking and feeding etc), and energy-saving and high-quality production systems through collaboration between robots and advanced sensing technology. We will introduce automated tractors used on site by 2020 as well as employing more than 20 types of new robots contributing to energy cut in the areas of agriculture, forestry, fisheries and food supplies.

In addition, we will press ahead with regulatory and structural reforms in a well-balanced manner in both terms of regulatory ease and rule setting for the purpose of enhancing utilization of robots in real society. We will also make concerted efforts in the establishment of new rules for collaboration between human and robots while abolishing unnecessary regulations based on accurate understanding of the current situations surrounding robots and levels of technology advancement in particular.

As part of the specific initiatives, we will discuss such issues as system for usage of radio wave regarding robots (Radio Act), review period of brand-new medical devicess, including thosethose utilizing robot technology (The Act on Securing Quality, Efficacy and Safety of Pharmaceuticals, Medical Devices, Regenerative and Cellular Therapy Products, Gene Therapy Products, and Cosmetics), procedures for additional items for coverage under official nursing care insurance with respect to nursing care robots (Long-Term Care Insurance Act), rules on vehicle-style assistance robots and automated operation (Road Traffic Act and Road Transport Vehicle Act), rules on unmanned flying robots (Aviation Act etc), method of robot utilization in maintenance and servicing of public and industrial infrastructures (laws regarding maintenance and servicing of public infrastructure and High Pressure Gas Safety Act), and framework for consumer protection (Consumer Product Safety Act and Electrical Appliance and Material Safety Act).

In addition, we will host the Robot Olympic Games (tentative title) in 2020 to appeal to the world a Japan as a place of robot showcase. We will set out specific form of hosting and competition events by 2016 while hosting a pre-Olympic event in 2018 ahead of the Robot Olympic Games.

(3) Development and progress of robot revolution on global perspectives
(preparing for the coming of advanced IT society)

With the advancement of IoT, a data-driven society is about to arrive where a variety of data is generated daily and forms of added value and socioeconomic structure are transformed through resourceful utilization of such data. It is imperative for Japan to create an innovation platform with key emphasis on robots in order to survive global competition and lead the global revolutionary trend in robotics against the backdrop of intensifying global competition over the object data in real society.

As part of the efforts for above, Japan should contribute through global cooperation and alliance in the establishment of global standards and various rules for both areas of manufacturing and others while keeping up with global trends in manufacturing fields like Industry 4.0 (Germany) and Industrial Internet (US).

In addition, utilization of robots should be developed further to lead the social reform movements in diverse areas of mobility, healthcare and energy through informatization as well as advancement of the wide-ranged overall production systems including supply chain management or marketing while maintaining its core function. In doing so, an extensive coordination with government agencies must be maintained such as Industrial Competitiveness Council, Council for Science, Technology and Innovation and Regulatory Reform Council as well as flexibly coordinating with foreign counterparts in promoting initiatives.

(Conclusion)

The industry, government and academic circle must steadily fulfill each assignment based on the new robot strategy and strive for further development in order to ensure realization of robot revolution in Japan without fail as well as appealing to the world a Japan as a great country of robotics utilizing robots in new phases of economy and society.

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The Headquarters for Japan’s Economic Revitalization