Strategy on Defense Production and Technological Bases

- Toward strengthening the bases to support defense forces and 'Proactive Contribution to Peace' -

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Ministry of Defense

Structure

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1. Context of formulation of strategy on defense production and technological bases 1

Past efforts regarding defense production and technological bases

・Most of Japan's defense production and technological base was lost at the end of WWII. The newly established JSDF(Japan Self-Defense Forces) was dependent on US deliveries and leases of defense equipment, but Japan strived to strengthen its defense production and technological bases by license production and indigenous production of major defense equipment, through government-industry cooperation based on the basic guideline for production and development of defense equipment (so-called *kokusanka-hoshin* (guideline for indigenous development/production) of 1970.

> Guideline for indigenous development/production (basic guideline for production and development of defense equipment etc. (July 16, 1970)
>
> 1. Basic guideline for production and development of defense equipment
> 2. The nature of defense requires that defense equipment for national defense suited to Japan's circumstances be developed; hence independent and indigenous development and production should be promoted.

・On the other hand, the environment surrounding defense equipment has dramatically changed in the 25 years after the 1990s.

Citations in National Security Strategy and NDPG

'In order to develop, maintain and operate defense capability steadily with limited resources in the medium- to long-term, Japan will endeavor to engage in effective and efficient acquisition of defense equipment, and will maintain and enhance its defense production and technological bases, including through strengthening international competitiveness.' (National Security Strategy (December 17, 2013))

'the Ministry of Defense will formulate a strategy that sets forth its future vision for Japan's defense production and technological bases as a whole.' (National Defense Program Guidelines for FY 2014 and beyond (NDPG), (December 17, 2013))

The place of this strategy

・Ministry of Defense (MOD) presents this strategy as a new guideline to replace the guideline for indigenous development/ production and to set out the direction for maintaining and strengthening defense production and technological bases, in order to strengthen the foundation to support defense forces and 'Proactive Contribution to Peace.'

・MOD and other related ministries must cooperate to flesh out the contents of this strategy.

・As with NDPG, this strategy will guide Japan's policy regarding defense production and technological base over the next decade. Considering changes in the security environment and state of defense production and technological base, however, this strategy will be revised as necessary after necessary reports to the National Security Council.

1. Context of formulation of strategy on defense production and technological base 2

Characteristics of Japan's defense production and technological bases

・Japan does not have state-owned armament production facilities. It is dependent on private defense industries for most bases of defense production, technology, maintenance and sustainment.
・Specialized and advanced skills, technology and facilities are required for R&D. Once lost, recovery would require a long time and great cost. In addition, the base relies on a broad and multi-layered network of companies, many of them small and medium-sized enterprises.
・Due to the 'Three Principles on Arms Exports,' Japanese defense industry's market has been limited to domestic defense demand.

・Unlike civilian industries that satisfy commercial demand, the maintenance and strengthening of defense production and technological bases and defense industries that support Japan's defense capability cannot be left to market mechanisms and competition; to supplement this appropriately, MOD and other relevant ministries should cooperate and take necessary measures.

Change of security environment surrounding defense production and technological bases

Weakening of defense production and technological bases

・Advances in defense equipment have increased per unit cost and maintenance/sustainment cost, causing a decrease in units procured.

・Curbing hires of young technicians and reduced opportunities for training have resulted in problems regarding retaining and training skilled technicians and passing on skills and techniques.

・Some companies, including small and medium enterprises, cannot cope with the reduced procurement units and pull out of defense business.

・Advances in defense equipment have also increased R&D costs, but the R&D budget's share in the defense budget has remained the same.

Realignment of European/US defense industry and advances in international joint development and production projects

・European/US defense industry has expanded its scope and improved its competitiveness through restructuring and consolidation.

・Technological innovation and rising development costs have made international development and production the standard for such equipment as aircraft.

・Japan was left behind by these changes in the environment due to conditions such as the Three Principles on Arms Exports. Some areas of Japanese defense technology, such as in advanced defense systems, now greatly lag behind the US as a result.

Formulation of Three Principles on Transfer of Defense Equipment and Technology

・Three Principles on Transfer of Defense Equipment and Technology announced in April 2014.

・Transfers which contribute to proactive promotion of peace contribution and international cooperation or to Japan's security could be permitted, conducting strict management.

・Appropriate overseas transfer of defense equipment contributes to maintaining and enhancing Japan's defense production and technological bases, thereby contributing to enhancing Japan's defense capability.

Henceforth, to maintain and strengthen Japan's defense production and technological bases, the above changes in environment will be taken into account, and acquisition means appropriate for the characteristics of each defense equipment will be strategically selected and appropriate measures enhanced and strengthened.

2. Goals and significance of maintaining and strengthening defense production and technological bases

・Through maintaining and enhancing defense production and technological bases, (1) Ensure sovereignty of security, (2) Contribute to latently enhance deterrence and maintain and enhance bargaining power, and (3) Contribute to advance domestic industry led by highly sophisticated technology.

(1) Ensure sovereignty of security

・Bases to supply defense equipment satisfying performance requirements based on operational concepts which conform to Japan's geographical characteristics and policy.
・Bases to realize operational support, such as maintenance, sustainment, improvement, repair, technological support, and supplying of parts necessary for the defense forces to exert their capabilities.
・Bases to procure defense equipment which requires protection of classified information and is difficult to obtain from overseas.

(2) Contribute to latently enhance deterrence and maintain and enhance bargaining power

・Contribution to latently enhance deterrence through possessing industrial capability sufficient to build up defense forces in a timely manner at Japan's will

・Bargaining power in purchasing defense equipment from overseas or through international joint development and production

(3) Contribute to advance domestic industry led by highly sophisticated technology.

・Defense industry needs a broad range of supporting industries. Their stable activity provides domestic employment and is expected to have a positive economic effect on the area and the whole country.
・Promotion of applying results gained from defense-related projects to commercial technology is expected to lead the improvement of industrial and technological capability, and have a positive ripple effect on the entire industry.

Taking these three goals and significance into consideration, Japan will maintain its defense production and technological bases which has been developed until now, in tandem with streamlining and optimizing defense equipment acquisition.

3. Basic stance for promoting measures

・Promote necessary measures based on the following basic view points: (1) Establish long-term government-industry partnerships, (2) Strengthen international competitiveness, (3) Ensure consistency with effective and efficient acquisition of defense equipment.

(1) Establish long-term government-industry partnerships

・Defense industry must invest in specialized technology and facilities to fulfill the specialized needs required. In addition, under the 'Three Principles on Arms Exports', buyer was limited to MOD.

・To maintain and strengthen defense production and technological bases, matters cannot be left entirely to market mechanisms; MOD and other relevant ministries should take necessary measures to supplement this appropriately.

・Taking care for fairness and transparency, an appropriate and long term partnership between public sectors and private ones with a feeling of tension.

・The environment should be improved so defense industries can have more future predictability and can invest, conduct R&D and train personnel from a long-term perspective. At the same time, defense industries must continuously work to enhance governance and compliance, while MOD must take measures to build appropriate relationships with defense industries.

(2) Strengthen international competitiveness

・In Europe and the US, giant and competitive defense companies with sophisticated technology and ample funds have emerged as a result of large-scale and cross-border restructuring and consolidation. Such companies provide highly advanced defense equipment systems throughout the world.

・There is no other way but to import defense equipment in some areas in which Japanese defense industry is less advanced or does not have equivalent technology. Under this circumstances, Japan's defense industries must strengthen their international competitiveness to survive.

・To nurture areas in which Japan has a comparative advantage internationally, and supplement the less advanced or missing areas as needed, these advantages and disadvantages need to be clarified and R&D projects, international joint development and production as well as utilization of dual-use technologies, should be conducted strategically and appropriately.

(3) Ensure consistency with effective and efficient acquisition of defense equipment

・To maintain and enhance defense production and technological bases, appropriate benefits for defense industries which allow reinvestment should be secured. At the same time, MOD needs to respond without fail to appropriate operational demands by JSDF, the user of defense equipment, and also pursue procurement in the most efficient manner.

4. Methods of defense procurement 1

・MOD currently acquires defense equipment through various ways such as domestic development, licensed production and imports. To maintain and enhance defense production and technological bases effectively and efficiently, henceforth appropriate acquisition methods including international development and production must be selected according to the characteristics of each defense equipment. Below follows the basic guideline for acquisition of defense equipment.

(1) Areas in which domestic development is desirable

・Domestic development is an acquisition method that links directly to maintaining and enhancing defense production and technological bases. As such, for defense equipment for which domestic technology can meet the conditions regarding SDF performance requirements, operational support, life-cycle cost and delivery schedule,
domestic development should be basically selected.

・ Performance requirements for some defense equipment cannot be revealed without endangering Japan's national security, making it inappropriate to rely on imports in such areas.

When procurement through imports is difficult due to such reasons, domestic development should be basically selected.

【Points to bear in mind】

・ Bear in mind that domestic development is accompanied by risks regarding technology and development and procurement cost overruns.

(2) Areas in which international joint development and production is desirable

・ Merits of international joint development and production are as follows:

1. Improvement of domestic technology through gaining access to advanced technology possessed by participating nations.
2. Strengthened alliances and friendly relations and improved interoperability of defense equipment as mutual interdependence rises among participating nations
3. Reduced development and production costs and shared risks among participating nations

・Considering the strengths and weaknesses of Japanese technology, if the above-mentioned merits of international joint development and production can be sufficiently achieved, procurement through international joint development and production will be considered.

【Points to bear in mind】

・ Since participating nations' various opinions affect the project, often enormous effort is required to coordinate among participating nations and administrating and managing the project.
・ There is a possibility that Japan's performance requirement will not be fully met.
・ It is accompanied by risks regarding technology and development and procurement cost overruns.

4. Methods of defense procurement 2

(3) Areas in which licensed production is desirable

・ When the required technology to satisfy MOD's performance requirements regarding the defense equipment is not available in Japan, and domestic development cannot be achieved immediately or development would require huge cost, and in addition, defense production and technological bases need to be maintained within Japan to ensure an operational support base, such as maintenance and upkeep of defense equipment, licensed production will be pursued.

・ Licensed production is selected only when it is difficult to select international joint development and production in terms of cost and schedule.

・ When licensed production is selected, efforts should be made to ensure that technology is accumulated within Japan so that domestic development can become an option in the future.

【 Points to bear in mind 】
・ Compared with imports, procurement costs tend to be high. In addition, it is sometimes difficult to adapt defense equipment procured through licensed production to meet Japanese unique requirements.

・ Opportunities for technology transfers through licensed productions have been inclined to decrease in recent years.

(4) Utilizing civilian goods

・ When the required technology is not dedicated solely to defense needs and civilian technology can meet performance requirements, MOD will promote utilization of output of civilian technology.

【Points to bear in mind 】
・ From the perspective of maintenance and upkeep, it is necessary to bear in mind that the life-cycle of civilian goods is relatively shorter than that of defense equipment.

(5) Imports

・ Imports will be selected for:
1. Functions and defense equipment in which the technology possessed by Japanese defense
production and technological bases lags behind but acquisition during a certain time period is required, and the performance, life-cycle cost and delivery schedule meets MOD's requirements.
2. Equipment that is procured in small quantities or is unique.

【Points to bear in mind】
・ When a defense equipment is expected to become strategically significant in the future, MOD will consider domestically possessing a basis for continuous technological research as well as maintenance and upkeep in order not to lose a potential domestic technological base which may allow future domestic development.
・ It is necessary to bear in mind risks of procurement cost overruns, delivery delays and continued maintenance and upkeep.

5. Measures for maintaining and strengthening defense production and technological bases 1

・To maintain and enhance defense production and technological bases, various acquisition methods which meet each defense equipment's characteristic should be combined and measures for maintaining and enhancing bases promoted. In doing so, 1. MOD will identify the specific strengths and weaknesses of Japan in all technological areas regarding defense equipment. 2. In addition, considering the trends in defense technology, MOD will ascertain the direction of required technology by anticipating the functions and performances which future defense equipment will require and take measures which emphasize appropriate balance and efficiency.

(1) Improve Contract System

1. Utilize negotiated contracts

・To allow for prompt and efficient acquisitions and improve predictability for defense industry, while ensuring transparency and fairness, parties available for negotiated contracts will continue to be sorted and clarified, and utilization will be promoted.

2. Introduce longer-term contracts (multi-year procurements)

・Introduce longer-term contracts which will raise predictability for companies and lead to lower procurement costs as companies can conduct stable and efficient facility investment and personnel distribution as well as pursue economies of scale regarding procurement of parts and materials.

3. Establish flexible systems for accepting orders such as joint ventures

・MOD will consider establishing a better system for accepting orders, while ensuring transparency and fairness. It will utilize a company selection process that enables companies to bring together the most advanced technology of each and allows MOD to acquire internationally competitive defense equipment, as well as frameworks such as joint ventures as necessary.

4. Decrease procurement cost and improve companies' incentives to reduce cost

・The provision requiring return of excessive profit has been pointed out as not serving as an incentive to reduce cost. As such, MOD will study other contract measures that would encourage incentives for reducing cost more.

・Build database regarding defense equipment procurement through cooperation with companies.

5. Enhance project management throughout the equipment's life-cycle

・For acquisition of major defense equipment, MOD will develop a system that allows for unified project management throughout the equipment's life-cycle, from equipment design to eventual disposal, by establishing an IPT(Integrated Project Team) under a Project Manager.

・When implementing projects, MOD will consider systems that allow for reconsideration, including project cancellation, when there is a significant discrepancy between estimated initial life-cycle cost and the actual costs.

5. Measures for maintaining and strengthening defense production and technological bases 2

(2) Measures Regarding Research and Development (R&D)

1. Formulate a R&D vision

・Formulate a vision which sets the future direction for medium- to long-term R&D of major defense equipment, and present a future concept for defense equipment and a R&D roadmap for it.

Strategy on defense production and technological bases

Result of capability assessments

Direction of promotion of R&D in MTDP *

* To secure technological superiority in strategically important areas, and considering the latest trends in science and technology, changes in battle field techniques, the potential for international joint research and development, and availability of effective joint operations among major equipment, MOD will systematically conduct advanced research from a medium- to long-term perspective.

Select target defense equipment considering the above points

Study R&D vision

Considering trends in defense technology, such as smart technology, networking, and unmanned operations, MOD will formulate a concept for future defense equipment in approximately 20 years (e.g. future fighter jet, unmanned defense equipment, future guided missiles), as well as a R&D roadmap (R&D plan).

Publish, and share medium- to long-term R&D plan with defense industry

Based on R&D vision, further effective and efficient R&D will be realized.

2. Develop ability to survey technological information including civilian advanced technology

・To promote utilization of dual-use technology and nurture research in companies for advanced defense equipment, MOD will expand its survey area of civilian advanced technology, improve its ability to survey technological information, and formulate and publish a medium- to long-term strategy on technology (Medium- to Long-Term Defense Technology Outlook).

3. Strengthen cooperation with universities and research institutes

・MOD will proactively utilize civilian technology applicable to defense equipment through improving cooperation with research institutes of independent administrative agencies and universities

4. Cooperate with and utilize R&D programs including those that cover dual- use technology

・Closely follow domestic advanced technology development programs, such as 'ImPACT,' and utilize outputs which can be used as dual-use technology.

5. Fund advanced research with promising output for defense

・Study a MOD funding system for nurturing promising research in universities and independent administrative agencies, which deserve notice for potential application to defense equipment.

6. Strengthen cooperation with overseas organizations

・To utilize technology regarding defense equipment and dual-use technology that will allow effective maintenance and enhancement of technological bases, MOD will promote international cooperation, such as information sharing and joint research.

5. Measures for maintaining and strengthening defense production and technological bases 3

(3) Defense Equipment and Technology Cooperation

International joint development and production projects

1. Deepen Defense Equipment and Technology Cooperation with the United States

・Deepen bilateral cooperation in the areas of defense equipment and technology through such means as the U.S.-Japan Systems and Technology Forum (S&TF)

・Consider joint development of SM-3 block 2A and industrial participation in F-35A, taking into account the maintenance and strengthening of Japan's defense production and technological bases.

・Engage in coordination for a framework regarding Reciprocal Defense Procurement.

2. Establish new Defense Equipment and Technology Cooperation

・Build cooperative relationships with major European countries with competitive defense industries, such as UK and France.

・Proactively build cooperation with friendly countries in the Asia-Pacific like Australia, India, and Southeast Asia countries, regarding non-traditional security issues such as maritime security, disaster relief and anti-piracy efforts.

3. Contribute to international logistics systems

・Respond to global logistics needs and expand contribution to international logistics through supplying parts, making use of Japanese companies' strengths (sensors, parts such as semiconductors, composite materials, advanced materials, high quality and punctual manufacturing, etc.) and experience in licensed production between companies

4. Improve foundation for defense equipment and technology cooperation

・Formulate a framework which will enable the transfer of defense equipment with nations that are likely to become partners in international joint development and production projects.

・Study systems and mechanisms for smoothly promoting cooperation under government commitment and management throughout the life-cycle of the transferred defense equipment

5. Promote application of defense equipment to civilian use

・Promote application of defense equipment to civilian use, for foreign countries, other ministries, local governments and private companies.

・Develop arrangements regarding use of technology-related materials possessed by the Ministry of Defense in areas other than aircraft

6. Technology control and information security

・Appropriately evaluate the sensitivity and strategic value of defense technology and dual-use technology and strengthen technology control functions.

・Promote cooperation with METI and contribute to strict examination and appropriate control under the principles on transfer of defense equipment and technology.

・Should an agreement on security information protection and patent exceptions be needed, consider the issue through cooperating with relevant ministries as needed.

5. Measures for maintaining and strengthening defense production and technological bases 4

(4) Measures regarding defense industry organization

Characteristics of Japanese defense industrial organizations

・Unlike in Europe and the U.S., there are no giant defense contractors in Japan.
・Generally, the share of defense business within the company's overall business is low and do not command the attention of top executives.
・Compared to Europe and the U.S., restructuring and consolidation of defense industry has not advanced in Japan. In addition, some companies have exited the defense business, after considering profitability and growth potential.

1. Promote understanding of significance of defense business and industry

・Improve environment so that top level executives understand and evaluate not only the profitability of defense business but also the significance of defense business appropriately
・Promote Japanese people's understanding of the significance of defense industry in contributing to our security through the defense white paper and other means

2. Maintain resilient supply-chains

・Assess the supply-chains of major defense equipment through cooperation between government and prime contractors, and take measures to maintain them.
・Study necessary security measures, such as to prevent intrusion of spyware into supply-chains
・Study the future of maintenance and sustainment and logistics through expanding PBL contracts and other measures

3. Defense industrial organizations and applications of contract systems

・In areas where excessive price competitions by similar multiple companies cause would weaken defense production and technological bases, utilize a company selection system which enables companies to bring together their strengths and streamline defense industrial organizations through narrowing down contractors by concluding multi-year contracts.

(5) Strengthen MOD's structure

・As part of MOD reform, structural reorganization is being considered to combine equipment acquisition related departments possibly into an affiliated agency. In this reform, in addition to enhancing project management throughout the equipment's life cycle, MOD must consider an appropriate way and organizational structure to ensure implementation of measures set forth in this strategy such as defense equipment and technology cooperation.
・Study enhancing inspection functions and training of personnel engaging in project management and procurement.

(6) Measures in cooperation with relevant ministries

・Study utilizing assistance measures of relevant ministries.
・Implement measures to allow defense industries to smoothly make use of assistance measures such as tax preferences and subsidies, through enhanced cooperation with METI.
・Study assistance measures such as fiscal investments and loans, for measures such as transfer of defense equipment, which contribute to maintaining and enhancing defense production and technological bases.

6. Course of action for each area of defense equipment 1

(1) Land-based equipment

・Tanks and cannons: to maintain and pass on expertise and skill so can respond to unforeseen future changes in the environment, MOD will make an effort to maintain appropriate level of defense production and technological bases by building on high international standard. In addition, MOD will try to establish defense production and technological bases of equipment in response to changes in our security environment, such as mobile combat vehicles.
・Wheeled ground vehicles: MOD will try to maintain and enhance their defense production and technological bases by achieving effective and efficient acquisition of defense equipment through further standardization of defense equipment and the development of product families.
・MOD will reinforce areas in which Japan lags behind if needed, such as amphibious functions, and promote defense equipment and technology cooperation by making use of Japanese strength. In addition, MOD will try to maintain bases by maintaining and passing on expertise and skills through efforts such as raising predictability for companies.

(2) Supplies

・Considering suitability to Japanese physical features, and the safety and morale of JSDF members, in order to continue to acquire from domestic companies, MOD will try to promote measures for raising predictability for companies for maintaining bases. In addition, MOD will study the possibility of applying defense equipment to civilian uses and defense equipment and technology cooperation in areas such as chemical protection equipment in which Japan holds an advantage.

(3) Warships and vessels

・Surface ships: Although some countries export warships and transfer technology, it is difficult to acquire the most advanced equipment. As such, in order to respond to new technology such as stealth capabilities, it is necessary to maintain and enhance production and technological bases composed of multiple prime contractors.
・Destroyers: Paying attention to maintain and enhance bases of shipbuilding and maintenance, MOD will study the possibility of bulk purchase of ships whose designs are standardized. On this occasion, contract systems will be reconsidered with a view to achieve lower prices.
・Submarines: MOD will increase the number of submarines to 22 in order to ensure security of the sea and airspace surrounding Japan. MOD will continuously maintain and enhance current bases by promoting research and development for upgrade of capabilities.
・Maintenance and upkeep: To maintain and increase availability of ships, while considering financial limitations, MOD will consider more effective overhaul and repair to the extent possible.
・MOD will promote defense equipment and technology cooperation in various areas, such as maritime security, by making use of Japanese strengths.

6. Course of action for each area of defense equipment 2

(4) Aircraft

・F-35A: MOD will strategically promote Japanese industrial participation in the production of F-35A in terms of maintaining and sophisticating defense production and technological bases and coordinating with related nations regarding establishing a regional maintenance hub for the Asia and Pacific region in Japan. The MOD will promote strategic studies including empirical research to accumulate and enhance fighter aircraft-related technologies in Japan so as to keep the option for development of next-generation fighter aircraft, including the possibility of international joint development, to replace the F-2 when it retires.

・Transport aircraft and amphibious rescue aircraft: MOD will promote multifaceted utilizations of output of development, such as adjusting defense equipment to civilian use and defense equipment and technological cooperation. In addition, regarding rotorcraft (helicopters), based on the technology developed by introduction of overseas technology through licensed production and domestic development, MOD will consider international development and production as an option, looking at both civilian demand and defense demand.

・Measures to improve efficiency in maintenance and upkeep of aircraft, such as new contract systems like PBL and international logistics systems such as ALGS of F-35, are already under way. MOD will study necessary measures to promote measures by Japanese companies.

(5) Ammunitions and explosives

・Ammunitions and explosives: As bases for the capacity to continue battles, it is vital to maintain their production and technological bases in order to secure sovereignty of security. MOD will try to achieve efficient procurement, and maintain bases which can ensure the continued procurement of substantial amounts of ammunitions and explosives from domestic companies, and acquire (in tandem with various procurement methods) necessary amounts to respond to various situations. In addition, measures for raising future predictability for both government and industry will be studied.

・Torpedoes: MOD will continue to conduct R&D on further quietening of propulsion systems, wider bandwidth of guidance control functions, response to shallow-water, and try to improve the capability and technological bases of torpedoes.

(6) Guided Missiles

・To respond to improved capability of threats quickly and keep technological advantages, MOD will maintain and enhance bases to enable continued domestic development of certain kinds of guided missiles.

・To strengthen its air defense capabilities, MOD will conduct a technical review of next-generation surface-to-air guided missiles with a view to replacing the functions both of the GSDF middle-range surface-to-air guided missile and the ASDF PATRIOT surface-to-air guided missile. In addition, in order to respond to new threats and secure effective operations, MOD will formulate a R&D vision for technical review of future guided missiles, including propulsion devices such as solid rocket motors required for extending the range of guided missiles.

・Since cases of international development and production have increased in this area, MOD will select efficient means for acquisition including the possibility of joining international joint development, while considering the improvement of interoperability with allies and friendly nations. Regarding SM-3 block IIA, MOD will continue to promote joint development with the U.S., and considering maintaining and enhancing defense production and technological bases, MOD will study the transition to production and deployment and take necessary measures.

6. Courses of actions of each area of defense equipment 3

(7) Communication Electronics, Command and Control System

・MOD will conduct focused research and development regarding advanced technology based on defense demand, such as improvement detection capability of fixed warning and control radar systems and improvement of detection capability through utilizing multiple sonars simultaneously. In addition, MOD will maintain and enhance technological bases by pursuing applicability of civil advanced technology.

・Regarding future command and control systems, systems which are suited to network-data centric warfare, such as integrated systems for facilitating joint operations, strengthening functions which supports decisions of commanders, will be required. Considering these points, MOD will utilize the civilian technological bases which are developing rapidly regarding technology of development of integrated systems and data processing technology, to enable timely overhauls of systems to reflect the latest technology.

・From the perspective of maintaining and enhancing defense production and technological bases, MOD will promote defense equipment and technological cooperation and adjusting defense equipment to civilian use. This will be done in areas in which technologies are based on defense demand, such as software defined radio technology and radar technology utilizing high output semiconductors, and where Japan has strengths

(8) Unmanned Equipment

・Although JSDF possess few unmanned defense equipment at this time, development of this area has advanced internationally. As such, considering future battle field techniques, trends in defense technology, such as smart technology and networking, and joint operations, MOD will formulate a R&D vision in order to give direction to unmanned equipment, such as autonomous future unmanned aircraft, and conduct research proactively in order to improve technological bases.

・Many research institutions possess sophisticated civilian technology in this area, so MOD will try to raise the level of unmanned equipment related technology through promoting cooperation with other research institutions regarding element technology research in the area of robots and unmanned equipment which can be used for defense purpose.

・Some states have conducted advanced research and development regarding unmanned equipment and operated them, so MOD will try to sophisticate technological base at an early stage through promoting defense equipment and technology cooperation with these countries, such as joint R&D.

(9) Cyber Security and Space

・Cooperating with measures to improve response capabilities against cyber attacks and guidelines for space development and use of space in MOD, MOD will study the future of defense production and technological bases which will be necessary in the future in terms of defense of Japan.