FORCE MODERNISATION: CHALLENGES

P.K. MEHRA

The most important reason for taking up 'force modernisation' is to impart a quantum jump to the capabilities of the defence forces in the entire range of military operations. Although force modernisation is a continuous process, its direction is technology dependent, and the quantum depends on the available resources and strength of the likely adversaries. The future is uncertain and there are no permanent friends or enemies, therefore, it is incumbent to take steps to match the capabilities of the neighbours and others likely to become competitive. Military strength has a bearing on the overall strength of any nation-state, hence, all countries continue to develop and, perhaps, move rapidly towards acquiring state-of-the-art equipment and technology. Ultimately, the commanders have to question whether the combat forces under his command will be able to successfully perform all the missions they are called upon to do so. A study of our own existing inventory which is based on decades-old technology and has degraded over a period of time, immediately drives home the crying need to recapitalise the equipment through either replacement or upgradation. The capabilities have to be built across the entire spectrum of conflict, with an eye on more recent trends like 4th generation warfare, which is real and which we are likely to face at some time in the future.

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With the rise of India, other countries look at us as an important actor in the stability of the Asia-Pacific region. The global community is looking at India and China for growth, increase in trade and financial flows, especially during these times of recession. India has to manage its relationship with the neighbours and adequately respond to the threat of terrorism to remain on the path of growth. But here is the caveat that no country has been able to maintain growth and achieve supremacy without intrinsic military strength.

In India, air power and, in fact, aerospace power holds the key to maintaining an edge over the likely adversaries and it surely cannot happen with the three to four decades-old inventory of fighter aircraft, airlift capability and other combat support equipment. Besides military hardware, there is a need to develop capabilities to hit the soft ribs of the adversaries and affect their ability to conduct war using cyber space. Additionally, space power is needed to give our war-fighters the precise advantage in surveillance, persistence, assessment of results and thereafter reengage with decisive and overwhelming force.

LIKELY NATURE OF FUTURE WARFARE AND CAPABILITY BUILD-UP OF LIKELY ADVERSARIES

The Indian defence forces have to be prepared for war across the entire spectrum of conflict. Aerospace power is expected to play a major role in winning wars and indigenous capabilities need to be developed for self-reliance. No country can become a power to be reckoned with by riding on the shoulders of other military powers. Concepts like "Comprehensive National Power" are in use to determine the total potential of a nation but it is suggested that at least a systems analysis should be carried out to determine our existing capability to fight different kinds of conflict and to determine the discrepancies in our arsenal.

A comparison with other military powers in our region indicates the steady erosion of the advantage in our combat potential in terms of

number of aircraft and hi-tech equipment. With the induction of Beyond Visual Range Capability (BVR) and the already acquired SAAB Airborne Early Warning and Control (AEW&C) aircraft by the Pakistan Air Force (PAF), both countries will be almost at par, with India retaining a marginal advantage in technology and numbers. The upgrade as well as supply of F-16s to the PAF must be kept in mind when we talk about parity. The F-16 upgrade kit will include the APG-68 (V)9 radar, embedded INGPS, APX-1 13 advanced IFF, ALQ-211 (V)9 defensive EW suite, NVG system cockpit and external lighting, AIM-120 AMRAAM capability and AGM-74 Harpoon missile capability. This substantial improvement in PAF capability along with their joint development of J-17 aircraft with China as also the possibility of the sale of the J-10 has considerably eroded the Indian Air Force (IAF) superiority. When this potential is coupled with the Pakistani policy to foment internal trouble and flashing of the nuclear card, using a host of operational nuclear tipped missiles of the Shaheen and Ghauri class, then the need to build up IAF potential is all the more urgent. Only the development of the Submarine-Launched Ballistic Missiles (SLBMs) can provide the well needed edge in the triad for India.

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China has been steadily developing the infrastructure in the Tibetan region and our own efforts do not count for much on the ground. China is working towards transforming its military force and building its capabilities to counter the US, especially in the Taiwan Strait and South China Sea. No doubt, the Chinese are far from achieving parity with the US, but their emphasis on attacking the weaknesses of the adversaries and huge investments in technology development mean that they will be a formidable adversary. China is focussed on developing capability for anti-access and area denial, keeping in mind the US commitment to defend Taiwan in case of an attack by Mainland China. Even the investment in defence Research and Development (R&D) by China is huge when compared to the amount

spent by India. It has been variously put at $30 billion vis-a-vis India's $1.65 billion.

EARLY EFFORTS AT FLEET AND EQUIPMENT MODERNISATION

There are four noteworthy events in the history of the modernisation in the Indian Air Force. The first was the development of the HF-24 aircraft, which was the best airframe design of that time. This design could compare with best in the world but for the engine. Extensive efforts were made to get an engine from the UK, France, USSR and also to manufacture it in Egypt but ultimately we had to fall back on the Orpheus 703 engine, with plans to design a reheat system for it. The HF-24 was underpowered and, hence, the aircraft did not see full life. The second was the attempt to modify the MiG-21 FL and this project study was done by Hindustan Aeronautics Limited (HAL) but this was nipped in the bud because the Soviets offered the MiG-21 M which had all the suggested improvements. This was another setback to our design and upgrade capability, which, if nurtured, could have transformed our aircraft industry. The third was the induction of Surface-to-Air-Missiles (SAMs), which gave a quantum jump to our Air Defence (AD) capability. This system was contemporary when inducted but the IAF did not realise the developments taking place the world over and continued with this highly manpower intensive system.

No other serious efforts took place to upgrade aircraft/systems till the setting up of the Inertial Navigation Integration Organisation (INIO) as a project under the Ministry of Defence (MoD) to upgrade the Jaguar Nav attack system. This project was a success story where HAL, the Defence Research and Development Organisation (DRDO) and IAF personnel worked along with foreign vendors from the UK and France and produced the Darin 1. The project faced the usual delays but downgrading and thereafter, the disbanding of the team resulted in loss of the expertise. It took us years to set up another organisation under DRDO to design and develop the Light Combat Aircraft (LCA) as a technology demonstrator by the Aeronautical Development Agency (ADA). The present status should be well known to all those keeping in touch with current military aviation.

Meanwhile, the IAF went in for the Mirage 2000 and MiG-29 aircraft to build multi-role as well as air superiority capability, especially with the availability of BVR missiles. The Su-30MKI placed the IAF in a totally different league which was really not foreseen initially. Development of the Su-30MK1 with Western and Indian avionics was the centrepiece of this plan, heralding the coming of age of our capability to integrate Western avionics and also producing some avionics equipment like mission computers, radar data processors, display processors and other Electronic Warfare (EW) and communication systems. The upgrade of the MiG-21 Bison, Jaguar Darin 2, MiG-27, etc has boosted the confidence of our aviation industry. Small and Medium Enterprises (SMEs) in the private sector have been engaged in developing a number of sophisticated components and even small systems.

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WHAT SHOULD BE THE FOCUS OF FORCE MODERNISATION

Domination of the Aerospace Domain

First and foremost, the concept of periodic upgrades of any and every equipment should be enshrined in our thoughts and actions. Replacements are essential but only when there are generational changes in the equipment and to bring about a transformation. Otherwise, plans must be in place soon after induction of the equipment for upgrade, depending upon the planned utility. India and the IAF do not have a culture of defining the life of equipment and sticking to a replacement or upgrade plan. The foregoing is possible in case research into developing technologies related to the inducted equipment is undertaken in parallel and even reverse engineering of some systems may be resorted to. For some, 'reverse engineering' may be a dirty word but all countries and manufacturers do it. No foreign vendor parts with the critical/latest technology even under Transfer of Technology (ToT) clauses, and modifications are difficult without basic design parameters. There are

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numerous examples like the R-73 and Litening pod on the M-2000, Sea Eagle, overwing Magic missile on the Jaguar, and Magic missile on the MiG-21 Bis. It is a painstaking process, but there is no getting away from it.

What follows is a wish list for any country which hopes to play a major role in world affairs. The pace of modernisation should be guided by systems analysis, commitment of resources, indigenous technology level and development, establishment of meaningful and transparent joint development programmes, encouraging the private sector in jointly funded technology development. It is better to develop or modernise your systems with already proven technologies rather than waiting for top-of-the-line equipment/technologies and losing precious steps in building combat potential and providing operational feedback to the technology developers. The focus of the IAF should be on the inventory comprising aircraft, aero-engines, missiles, weapon systems, combat support systems, cyberspace and space-based systems, with the intent to increase self-reliance.

The aircraft upgrades normally constitute mainly avionics and communication systems but what is essential is to also look at the possibilities of engine upgrade or engine change. The decades-old engines do not comply with the laid down environment norms and also efficiency in terms of fuel consumption. In case we are modernising an aircraft for the next decade and a half, then aero-engines should also become a part of our focus. The initial capital cost may be high but will be recovered by the time the aircraft is phased out, especially in the case of the transport fleet.

Aircraft

What is the suggested trend? There is a considerable slowdown in developing new fighter aircraft because of the prohibitive cost of development and also a shift of focus to unmanned aircraft. The USA, Russia and China are the

only ones developing aircraft but in collaboration with other countries. The manufacturers of the legacy aircraft are proposing to upgrade or replace the legacy 4th generation aircraft with 4+ generation (F-15, SAAB Gripen NG, Euro fighter tranche 3, Su-30 variants and MiG-35 aircraft), etc so as to retain the combat potential through numbers. The Unmanned Combat Aerial Vehicles/Unmanned Aerial Vehicles (UCAVs/UAVs) have proved their capability in Iraq and Afghanistan and, hence, a number of development programmes are going on. The Design and Development (D&D) for the Unmanned Aircraft System (UAS) covers the small micro/mini to High Altitude Long Endurance/Medium Altitude Long Endurance (HALE/MALE) and even the hypersonic programmes. In our case, the Indo-Russian programme is a sound proposal as long as both India and Russia know what they are bringing to the table to jointly develop this new aircraft. If Russia has developed 90 per cent of the technologies and India the rest, then we will have to seek the technologies from Russia and, hence, will become dependent. It is not possible to have transparency since individual systems are developed in different laboratories and will be guided by patent and disclosure restrictions. Joint development of 5th generation technologies with equal partnership and total transparency should be the aim.

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Development of a range of 10 and 20 ton class of transport aircraft with a possible civil version and civil application is the need of the hour. The short-term requirement for special purpose aircraft is being met through direct imports but it is in the Indian aviation industry's interest to develop indigenous capability to meet the long-term requirements. Based on the confidence gained through the development of Dhruv helicopters, a family of helicopters for utility (LUH) and combat (LCH) should be developed. Resources will have to be found in order to achieve the targeted self-reliance as enunciated by the Raksha Mantri (RM) and earlier by Dr A.P.J. Abdul Kalam. It is a bitter pill but with a healthy Gross Domestic Product (GDP) growth, it is possible. So far, nobody has identified the characteristics

and capabilities of the 6th generation and it is felt that UCAVs will play a greater role in future wars. In fact, I would suggest greater emphasis on UCAVs systems development for HALE or at least MALE. The need for persistence has been recognised and that is why development of airship-based surveillance systems is on the cards.

Aero-Engines

This has been a weak area and unless we are able to develop engines to fulfil our needs, we will remain dependent on others. In case the core engine, Kabini, of the Kaveri engine can be perfected, smaller engines can be produced for application in UAVs and small transport aircraft. Success in operationalising smaller engines albeit with reduced level of sophistication is better than aiming high and delivering nothing. Lack of success in the existing programme should propel the MoD/stakeholders to take a hard look, objectively ensuring that success is paramount and all the institutions and personnel involved are subordinate to the final aim.

Missiles

Medium and long-range surface-to-surface missiles provide the greatest deterrence value, especially since India is already a declared nuclear power. Examples of smaller countries like Iran and North Korea with capabilities to develop and launch missiles are there for all of us to see. Development of SAMs, Anti-Radiation Missiles (ARMs), Air-to-Air Missiles (AAMs) and long-range cruise missiles indicates technological prowess and, hence, the need to be focussed on them. Ballistic Missile Defence (BMD) systems, especially against multiple missile attacks, will play a major role considering the efforts being put in by our neighbouring countries to flex their muscles. The Prithvi Air Defence (PAD) missile has demonstrated success and its further development along with the associated radar holds the key towards credible deterrence, especially in view of our 'no first use' policy. Development of a nuclear submarine and SLBMs has assumed great importance in building up the triad in view of the Chinese thrust on developing a Blue Water Navy.

The existing radar network, whether ground-based or airborne, needs to be supplemented with a space-based early warning system. The DRDO has displayed its capability to develop missile defence systems but the larger question is about the responsibility for defence from the air and space. The IAF is responsible for air defence of our air space and it is but natural that BMD should be considered as an extension of the IAF's responsibility.

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Future Weapons

We have lagged behind in weapon systems development. So far, we have only developed dumb air-to-ground weapons. I understand that we are now developing laser guided bomb kits and I hope that it leads further to Joint Direct Attack Munition (JDAM) kind of weapons using both the Global Positioning System (GPS) and lasers. Precision strike capabilities have to be looked at as a system, together with aircraft, sustained surveillance, targeting and net-centricity. The capability build-up becomes that much more complex when all components of the system are looked at to define the capabilities. Only leap-frogging will help and the task force approach to develop the key technologies should be followed. Directed Energy Weapons (DEWs), using electro-magnetic or laser beams, will have huge applications in the future. The laser weapons are extremely precise and cost-effective even to intercept ballistic missiles but their development would be very expensive. DEWs have the advantage of multiple target engagements and rapid retargeting. Space-based DEW systems will be most effective but this capability is far in the future.

SAMs have been developed by DRDO and there are ongoing programmes in collaboration with foreign vendors. SAMs and BMDs should become seamless for the comprehensive and credible defence of Indian territory and air space.

Reduced dependence on foreign weapons suppliers through indigenous development of AAMs, CCMs, ARMs and cruise missiles is the call of the

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day. Some headway has already been made but fresh initiative is required to make these weapons operational and effect improvements through the induction of the latest technology. Even smaller and more effective bombs and other air-to-surface strike weapons are essential to improve the combat potential of our aircraft weapon systems.

Combat Support Systems

The IAF has rightly shifted its focus to acquiring combat support systems and many of them are in the pipeline. These inductions will provide immediate capability but will not serve the purpose of self-reliance unless technologies are developed simultaneously and the future upgrades/replacements of these systems are done with indigenous elements. Airborne Warning and Control System (AWACS)/Airborne Early Warning and Control (AEW&C), aerial refuelling equipment, different range/technological capabilities surveillance radars for both ground and airborne applications, a range of Electronic Warfare (EW) and Electronic Support Measure (ESM) equipment, adoption of network-centricity for future warfare are some of the support elements, which need to be developed indigenously. The amount of information required for network-centricity is maddening considering the need for physical surveillance, communication surveillance, Human Intelligence (HUMINT) and geo-awareness to be included and fused to complete the picture.

OPERATIONS IN CYBER SPACE

With an ever increasing reliance on flow of information and accepting the tenets of Net-Centric Warfare (NCW), cyber space is the new domain where wars will be conducted in the future. Control of information has, and will continue to be, a central component of military operations. China has already stated its aim to attack the soft ribs of a powerful adversary and prepare for a war in the backdrop of informationisation.

A number of reports have appeared concerning attacks through cyberspace at different locations and in both civil and military environments. The effects have been contained so far but these are probes to assess the durability of protection measures, and efforts will be on to defeat the protection devices. Nevertheless, these intrusions have shown that they create tactical, operational and strategic effects at low cost and with relative impunity.

What needs to be understood is that the capability to conduct cyber warfare cannot be limited to any one component of the defence force or civilian strategic sphere and, hence, highly qualified personnel must be employed without any reservations and irrespective of their affiliations.

SPACE-BASED SYSTEMS

Although the IAF is late in realising the potential of space-based surveillance systems, the plans to launch a dedicated satellite comprise good news. Both sustained surveillance and global communications are essential for net-centricity and the same has been amply demonstrated during the Chechen War in 1999 and the past and ongoing Gulf Wars. A networked precision strike to incapacitate terrorists and their camps will be possible by fusing information from a large number of sensors, including those based in space. Development of hypersonic vehicles flying through near space is another area of interest but can be given low priority since developing a scramjet engine is far into the future.

SOFTER ASPECTS OF FORCE MODERNISATION

All force modernisations have two aspects viz, equipment and personnel. It is easy to visualise the weapon systems requirement since this aspect is always given prominence but the aspects of organisation structure, Human Resource Development (HRD) like training and leadership do not get the required focus. Both these are interdependent and must develop simultaneously for a smooth induction and operationalisation of new equipment. Some of the systems demand a huge change in work culture and these new philosophies can be absorbed only through an overhaul of

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our so-called time-tested systems. A higher level of leadership is required in order to change our Concept of Operations (CONOPS) and especially so when jointness is involved.

INITIATION OF THE MODERNISATION PROCESS

Modernisation may be achieved either through fresh acquisition or upgradation. The process is based on a study carried out to build capabilities to meet the operational tasks of the future and also replace the obsolete equipment to retain the combat potential. This defence procurement planning process is split into the long-term, medium-term and short-term, comprising the 15 years Long-Term Integrated Perspective Plan (LTIPP), the 5 years Services Capital Acquisition Plan (SCAP) and the Annual Acquisition Plan (AAP). The LTIPP and SCAP are prepared by Headquarters Integrated Defence Staff (HQ IDS) in consultation with Service HQ and are approved by the Defence Acquisition Committee (DAC) and the AAP is approved by the Defence Procurement Board (DPB). The AAP should cover a period of two years and invariably form a part of the approved SCAP. In formulating these plans, the Operations Branch in the Service HQ compares the existing combat potential with the targeted potential after a scan of developments in the neighbourhood, government policy direction and available technologies. The operational requirement of each and every type of equipment is clearly defined before the Plans Branch converts them into Service Qualitative Requirements (SQRs) and obtains approval from the highest level. The draft SQRs go through an iterative process and have to be cleared by a number of agencies outside the Service HQ but mostly within the MoD before finalisation. Simultaneously, the Plans Branch issues Requests for Induction (RFIs) through our Defence/ Air Attaches to the known suppliers of equipment. Most of this information is gleaned through the Internet and the rest from the vendors registered with MoD.

The acquisition process for schemes categorised as 'buy' and 'buy and make' with ToT, will involve the following functions:

- Services Qualitative Requirements (SQRs).
- Acceptance of Necessity (AoN).
- Solicitation of offers.
- Evaluation of technical offers by the Technical Evaluation Committee (TEC).
- Field Evaluation.
- Staff Evaluation.
- Oversight by Technical Oversight Committee (TOC) for acquisitions above Rs 300 crore.
- Commercial negotiations by Contract Negotiation Committee (CNC).
- Approval of Competent Financial Authority (CFA).
- Award of contract / Supply Order (SO).
- Contract administration and post-contract management.

MAKE OR BUY DECISIONS

It is relatively easy to build up a wish list and have it approved as part of the long-term reequipment plan but the process of induction of equipment is mired with roadblocks at every step. The Defence Procurement Procedure (DPP) 2008 is the Bible for defence capital acquisitions and it has been refined over the years to overcome the lacunae of the earlier system of acquisition. There have been considerable efforts to attract investments in the defence industry since 2001 through easing of controls but it did not lead to major investments due to the wait and watch attitude of the industry. Some of the other policy decisions concerning categorisation of some private industries for preferential treatment (Raksha Udyog Ratnas) at par with Public Sector Undertakings (PSUs) did not take off. Make or buy decisions have a great bearing on the level of self-reliance. The introduction of 'make or buy Indian' should help in pushing the private industry to create joint ventures with foreign vendors and offer an increasing number of products being manufactured in India. There is also a case for consideration to identify some private industry that can undertake R&D in defence equipment. There

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should be joint funding for R&D, with the MoD holding the patent.

CHALLENGES IN DEFENCE ACQUISITIONS

It is essential to decide whether to acquire new equipment or upgrade the existing one. A number of factors are to be considered, the important ones being the source of the equipment, its vintage, whether the equipment is in use extensively or restricted to a few countries, the cost factor, residual life after upgradation etc., to decide the number of aircraft/systems required, especially when the new system has multi-role capability, is of a much higher technology and, consequently, is much costlier than the aircraft/system it will replace. For a country of our size, numbers are as important. It is agreed that these multi-role aircraft can be based in the rear and they can provide support to different theatres of war but still the numbers are important to maintain positive asymmetry.

There is an ongoing debate on whether the UCAS will ultimately replace the manned aircraft or some key tasks will be given to the unmanned systems, controlled by an airborne/ground operator. This replacement is likely to happen some time in the future but for the next 15 years, manned aircraft will be the key element for winning wars.

It is important to evaluate the level of technology and whether it can be absorbed by our operators. Is it current and which vendor is offering better technology? There are occasions when the vendors have given equipment of older technology which they themselves have planned to phase out or the next version is already in the pipeline but they do not disclose the fact. A closer study of the level of technology on offer by different vendors will indicate the state-of-the-art and even if it is more expensive, it may be cheaper in the long run to buy the latest available.

When equipment is purchased from different vendors and from different countries, it may cause integration problems. Subsequently, this may lead to problems in jointness and networking. The level of ToT should include

adequate knowledge or an assurance from the vendor that active assistance will be provided in integrating weapons and systems from other vendors.

Lack of participation by the private sector, since the present policy envisages preferential treatment for PSUs and SMEs, is the biggest blow to our efforts for self-reliance. A level playing field must be provided for all.

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The restrictions on Foreign Direct Investment (FDI) in terms of percentage and lack of control over the decision-making due to limited investment, are also issues that need to be considered. Foreign vendors are reluctant to part with current technologies. There are restrictions on exports of items produced in the country. There should be some flexibility in FDI in percentage depending upon the level of technology on offer.

At present, offsets of a minimum of 30 per cent are mandatory in all projects worth more than Rs. 300 crore and this can be increased. For the Multi-Role Combat Aircraft (MRCA), it is 50 per cent. A case in point was the bid for helicopters. Some flexibility must be shown since the industry may not be able to absorb such large amounts of investments.

The fear of the involvement of middlemen/agents who may influence decision, is a hangover from Bofors. Involvement of middlemen and payment of bribes was recently unearthed and the last DG Ordnance has been indicted. Can we wish away the middlemen? The Central Vigilance Commission (CVC) had strongly recommended that agents may be officially permitted and registered to ensure transparency and probity but no agent has come forward to get registered. To state that agents can corrupt officials shows a total lack of confidence in the integrity of government functionaries. It implies that all officials dealing with defence procurement are predisposed to corruption and, hence, must be kept away from temptations. It is a sensitive subject and has to be a matter of trust in the team of government negotiators.

The determination of reasonable and fair cost of equipment is a highly complex and arduous task. This has to be done well before the commencement of commercial negotiations and a team of experts should be constituted for the task.

Public-private partnerships in the field of defence production need to be encouraged. The government has to take positive steps to push joint ventures between Public Sector Undertakings (PSUs) with the private sector industry.

We can consider the applicability of examples from countries like the USA, UK, Russia and Australia as well as public-private-DRDO partnerships in R&D, followed by production like the Israeli model.

CONCLUSION

Force modernisation is an ongoing process and needs to be enshrined in our thoughts and actions. It is both technology and resources dependent but the bottom line is to retain or improve the combat potential of our equipment so that it is capable of fighting the next war. India has to display its military prowess if it wants to continue on the growth path. The Indian Air Force does not have a decisive edge over its likely adversaries since both of them have learnt valuable lessons from the recent wars and are truly focussed on building up their air power. The Indian Air Force had embarked upon modernisation in the past but did not follow it up, otherwise we would have been well on the path to self-reliance. India has to focus on modernisation of aircraft, aero-engines, missiles, weapon systems, combat support systems, cyber space and space-based systems with the intent to increase self-reliance. It may appear to be a very tall order but it is feasible in a slow and sustained manner. There are huge challenges in defence acquisitions because of the lack of a level playing field for the private sector and the procedures for investment in R&D. There is also a need to follow the time-frames mentioned in the DPP and in case the acquisition is very complex, a separate time-table may be issued.