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Squadron 2020

The Finnish Defence Forces' strategic project

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Contents

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Cover and graphics: Vesa Viljanen/Naval Academy
Photos: The Finnish Defence Forces/Niko Muukka, Reijo Voutilainen, Jaakko Ala-Hiiro, Lisa Hentunen
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Summary

Finland's military defence capability consists of the Army, the Navy, the Air Force and the supporting joint capabilities. Development of all Services is vital for Finland´s defence. Because the sea lines of communications in the Baltic Sea are vital for Finland, maritime defence must be capable of conducting territorial surveillance and repelling attacks.

Minelayer Pohjanmaa, the former flagship, has already been decommissioned, and the four Rauma-class guided-missile patrol combatants (PGGs) and two Hämeenmaa-class minelayers will reach the end of their service lives in 2022-2025. As a result, the Navy's capabilities will significantly decline by the mid-2020s. The ship classes have been refurbished once and there are no cost-effective solutions to extending their service life.

The goal of the Squadron 2020 project is to replace seven vessels which have been or are scheduled to be decommissioned and to upgrade capabilities to counter modern threats by procuring four multi-role corvettes. The project is not aimed at changing the Navy's battle doctrine but rather at bringing a significant contribution to overall maritime defence. The project costs add up to EUR 1.2 billion.

The vessels of the Squadron 2020 project will form the backbone of maritime defence for the Defence Forces in the future; their capabilities are planned to be used into the 2050s. The main features of the vessels will be the capacity for year-round and long-endurance presence at sea in all weather and ice conditions of the Baltic Sea, command and control of maritime operations, anti-surface warfare in the open sea, mine-laying at sea and anti-submarine warfare. The capabilities to be procured through the Squadron 2020 project are based on the statutory tasks of the Defence Forces and the estimated requirements of the future operating environment.

The preparations for replacing the vessels scheduled to be decommissioned have been made in the long-term planning of the Defence Forces and for this purpose, operational and technical solutions have been studied and various vessel concepts have been compared. There is no existing vessel concept that would meet the requirements of the Navy. The capacity to navigate in ice and engage in mine-laying requires that a new type of vessel be designed. Modern surveillance and weapon systems will be integrated into the vessel. The resulting multi-role corvette with a strike capability will be fitted to our operating environment.

While the vessels will be manufactured in Finland, the weapons and sensors will be procured from overseas. The EU directives and the existing legislation in Finland will be applied so that benefits from industrial cooperation can be derived while building national security of supply. Expertise will be built and the ability to maintain also the foreign weapon and sensor systems will be created for domestic partners. From the perspective of Finland's defence, it is important to ensure security of supply that covers the service life of the vessels.

A decision on procurement will be made during this Government's term of office and the vessels will be built in 2019-2024. The project is vital for the future of the Navy.

Hämeenmaa-class minelayer (left) and Hamina-class PGG (right). The minelayers will be decommissioned by the 2025s whereas the Hamina-class PGGs will be refurbished and will remain in service into the 2030s.

Introduction

The goal of the Squadron 2020 project is to replace seven vessels which have been or are scheduled to be decommissioned and to upgrade their capabilities to counter modern threats.

Finland's defence will face an extraordinary situation in the 2020s when the main weapon systems of both the Navy and the Air Force will be phased out almost at the same time. The Squadron 2020 project and the replacement of the capabilities of the Hornet aircraft are key projects for maintaining Finland's defence and developing it in a balanced way. Both are strategic projects of the Defence Forces. They will be preceded by measures to ensure the Army's fire power and mobility.

While preparing the replacement of the Navy's combat vessel fleet, the Defence Forces has studied alternative solutions as a part of the Defence Forces' long-term planning and research. In line with Prime Minister Sipilä's Government Programme, the Government will decide on the replacement of the Navy's combat vessel capability. Minister of Defence Niinistö decided on the launch of the Squadron 2020 project on 25 September 2015. The construction of the vessels is scheduled to start in 2019 and they are expected to be completed during 2024. Full operational capability will be achieved by 2027.

As defined by the Ministry of Defence, the plan for the Squadron 2020 project and the procurement of four combat vessels are based on the budget of no more than EUR 1.2 billion. Strategic projects cannot be funded from the defence materiel budget of the Defence Forces without the entirety of the existing defence system collapsing. This is why strategic projects require additional state funding. This was also noted in the report by the parliamentary assessment group titled Long-term Challenges of Defence, published in 2014.

The Squadron 2020 publication describes the role of maritime defence as a part of the defence system and outlines how the Navy's capabilities are to be maintained in the 2020s. While it gives grounds for procuring four multi-role corvettes to maintain the Navy's capabilities it also discusses the procurement from the perspective of security of supply chain.

The Ministry of Defence was in charge of preparing the publication which is based on the results of long-term research and planning by different organisations and on information gathering and planning of the project group.

Finland's defence capability and military operating environment

The defence capabilities safeguard Finland's independence and regional integrity, prevents military threats and counters attacks against Finland. Finland must be capable of monitoring and safeguarding regional integrity and responding to military pressure, rapidly evolving military threat and a large-scale armed attack. Sufficient prevention and credibility are based on a defence capability in proportion to the operating environment and on adequate level of readiness. Securing of the functions vital for society, security of supply chain and defence cooperation are increasingly emphasised in today's world.

In recent years, Finland's military operating environment has become less stable. The early warning time for military crises has decreased and the threshold for using force has become lower. As military activity has intensified in the Baltic Sea region also tension has increased. The military strategic significance of the region has grown.

The use or threat of military force against Finland cannot be excluded. Consequently, as the operating environment has changed the demands on defence have grown. In modern warfare, speed, mobility, fire power, range of operations and operational readiness are key elements. Because of the rapid development of technology, more and more advanced unmanned and small-sized systems in space, on the ground, in the air, at sea and below the sea surface are likely to be seen. It is, however, equally likely that at least in the coming decades traditional fighting vehicles, fighter aircraft and surface combatants will be used.

The defence of Finland calls for the ability to carry out land, maritime, air and cyberspace operations; all services are needed and they must be capable of effective cooperation. The Defence Forces' most capable and rapidly deployable troops and weapon systems, such as the Navy's surface combatants, are able to raise the threshold against the use of force and, if necessary, begin to repel an attack from a high level of preparedness.

Maritime transport via the Baltic Sea is vitally important for Finland. Preventing the free use of the Baltic Sea, interfering with sea transport and cutting off sea lanes would affect the entire society. Even if Finland was not directly involved in an armed conflict in a neighbouring area, the situation would have very negative reverberations in Finland as well.

"The defence of Finland calls for the ability to carry out land, maritime, air and cyberspace operations."

"Maritime transport via the Baltic Sea is vitally important for Finland."

Conditions outside the archipelago are at times difficult.

The Navy as a part of the defence system

The Baltic Sea as an operating environment

In the international context, the Baltic Sea is regarded as a shallow and confined sea area which is not easily accessible.

The Baltic Sea area is characterised by busy merchant shipping and the countries in the area are dependent on regular maritime traffic without disruptions. The armed forces of individual states and NATO have a presence in the Baltic Sea. There are also a significant number of neutral vessels, for business or pleasure, and air traffic. A multinational operating environment, a number of different international actors and the proximity of other states pose challenges for marine operations both in normal and emergency situations.

There are a number of choke points in the Baltic Sea where the cut-off or control would have strategic impacts on Finland. The most important nodal points for Finland's sea transport are the narrows of Porkkala-Naissaari in the Gulf of Finland and the narrow of Märket in the Sea of Åland. Åland enjoys a special status in the Baltic Sea: it is demilitarised and Finland is obligated to defend it.

The shallow waters of the Baltic Sea and the proximity of the coast make it possible to set up and maintain fixed underwater structures in the sea bottom, such as communications cables and gas and oil pipes in a cost-effective way. These structures also allow for setting up and using permanent surveillance and intelligence devices.

The small size of the Baltic Sea, variations in weather conditions and water depth, and the narrow international waters limit the use of large submarines and large naval task forces. Large naval task forces are easily uncovered and they can be surprised and rapidly engaged in warfare. Mine-laying is an effective way of blocking the limited fairways and narrow passages. This would offer a relatively easy way to control the use of the sea area while causing considerable disruptions to shipping.

The Baltic Sea area is most usable for operating smaller conventional submarines and miniature submarines. Underwater operation of a conventional submarine requires a depth of at least 20 to 30 meters. Long operation times are possible because of short distances from the bases to the operation area. Submarines are capable of going down to the sea bottom almost all over the Baltic Sea and, compared to oceans, it is easier to take cover from submarine hunters.

Finland's archipelago provides shelter for the operations of our own surface vessels; it limits the enemy's capability to find and track targets for weapon systems. It is difficult to operate submarines in the Finnish archipelago because of radical variations of depth; on the average sea areas are shallow.

Gale-force winds and the resulting wave heights restrict the operation of light naval units on the open sea. The significant wave height may reach six meters and more annually in the northern part of the Baltic Sea. High waves, icy conditions, snow and sleet, and the rain and fog caused by temperature fluctuations weaken the performance of surveillance and weapons systems and hinder their use.

As a rule, aircraft in the Baltic Sea area operate from land bases. Short distances make it possible to use manned and unmanned aerial vehicles and, depending on weather conditions, the entire area may be covered by aerial reconnaissance.

The freezing of the sea restricts the naval units' freedom of manoeuvre and hinders the use of weapons systems as well as basing and force protection arrangements. Apart from mine-laying, very cold winters make submarine warfare and mine countermeasures particularly challenging.

The extent of ice cover in the Baltic Sea varies considerably from year to year but the severity of the ice-covered period does not entirely account for the difficulties caused for maritime transport. Pressure from gale-force winds on the ice cover forces layers of ice on top of each other and, eventually, forms ice banks. In a typical winter, our own harbours and the archipelago freeze while the rest of the Baltic Sea is unfrozen.

It is estimated that in the coming decades climate change will have various impacts also in Finland; for example, severe winters with an extensive ice cover are not likely to affect the Baltic Sea beyond the 2030s. It is, however, estimated that Finland's neighbouring sea areas will continue to freeze for about two months annually during an average and mild winter also into the 2050s. The Navy will have to have the capability to operate in icy conditions in the future, too.

The role of the Navy

A Navy's role in the international context generally relates to power projection outside of national borders, transport of army troops or attacking enemy naval forces and securing sea lines of communication. Landings, besieging a target, reconnaissance or the use of long-range weapons can be executed via sea areas, and naval operations are often a part of a larger operation. The navies of countries representing a defence-based military doctrine generally fight against these operations. Finland's maritime defence is built from the defence-based perspective. Naval warfare will be characterised by the use of the sea also in the future: freedom to use the sea or denying access to it.

In normal situations, the credibility of Finland's defence and national sovereignty are demonstrated through the safeguarding of territorial integrity. The capability to control own sea areas sends a signal to the international community about a country's ability to take care of own territory and ensure its lawful use. This requires the ability to operate in the entire sea area and build a comprehensive situation picture. When necessary, it is essential to be able to counter developments that threaten territorial integrity without further provoking the situation. The Navy must be in permanent readiness with the ability to foresee and take rapid action to safeguard territorial integrity as the situation requires.

The role of maritime defence is highlighted at the beginning of a crisis in securing the functioning of society. Maritime defence must be capable of controlling the territorial waters and targets in the archipelago that are vital for its operations. Control of the sea in a specific area is established through year-round presence and surveillance and, when necessary, by laying mines and using the surface-to-surface missiles to repel an attack on the coast and in the open sea. As a result, own operations are protected, a potential aggressor is threatened and the threshold to launch an attack is high. A limited use of force and scenarios of rapidly evolving situations underline the importance of effective presence in an operation area.

The tasks of the Navy are presumed to remain as they are now also into the 2030s; this will provide the basis for the development of the Navy. Maritime defence must be capable of repelling attacks from the sea, countering territorial violations and safeguarding sea lines of communication. Maritime defence units will support other authorities and crisis management tasks. In view of 2025, the critical capability requirements for the Navy are the ability for year-round surveillance and building situational awareness regarding the operation area, the defence capability of surface vessels, mine-laying, mine countermeasures, anti-submarine warfare and air defence.

"Naval warfare will be characterised by the use of the sea also in the future: freedom to use the sea or denying access to it."

The key tasks of the Navy

Surveillance of maritime areas and repelling violations of territorial integrity

As a territorial surveillance authority, the Navy is responsible for the surveillance and safeguarding of territorial integrity in the sea areas, in cooperation with the other Services and supervisory authorities.

Territorial surveillance is based on fixed systems which are complemented with information from naval units and mobile surveillance units, situation pictures from other authorities and international maritime situation picture. All surveillance information is then used to compile a national maritime situation picture. Territorial violations are primarily repelled by surface combatants. The Navy's readiness to order vessels to carry out tasks can be adjusted according to the situation. Air Force and Border Guard units can be used to secure territorial integrity also in the area.

Repelling attacks

Attacks from the sea are repelled by preventing the enemy from using its troops and engaging in battle against coastal and inland targets. Mine-laying operations, missile attacks against the enemy's naval task units and air defence measures are carried out. Coastal troops are used to protect key targets and secure free use of the archipelago.

In line with the Navy's mission, the enemy's freedom of action is denied by carrying out strikes on its significant targets on land and at sea in the depth of the entire operation area. The enemy's force is degraded and its freedom to use the sea is prevented. Concentrated missile strikes and mines are used to prevent enemy attacks. The goal is to prevent the enemy from projecting force to our own territory so that we can maintain our freedom of action and manoeuvre and safeguard assets and entities that are vital to society.

Surface-to-surface missiles and mines are the Navy's primary weapon systems which are used to create a threat to the enemy and thus a preventive threshold against hostile action.

Securing sea lines of communication

The goal in securing sea lines of communication is to secure the usability of maritime transport routes and this is carried out in close cooperation with other authorities. Maritime authorities are responsible for maintaining the operating conditions for maritime transport and its management. The Navy is responsible for safeguarding maritime transport.

During low threat level, the main part of activities may consist of creating situational awareness and identifying individual vessels. Harbours and the fairways leading to them are kept in operation in cooperation with other authorities. If the situation becomes critical, maritime transport can be concentrated and directed to pre-determined areas. The Navy's vessels can be concentrated in the most threatened areas to prevent submarine operations or to secure the usability of the network of fairways. Escort vessels can be provided to secure transport by sea. On the national level, all important maritime transports and critical military transports by sea are protected as a joint operation by the three Services.

Maritime operations

Maritime operations refer to a range of tools available to the Navy to execute their tasks. Military maritime operations include surface warfare, mine warfare, anti-submarine warfare and anti-air warfare. Operations aim at facilitating the use of the sea in line with set goals and denying the enemy's freedom to use the sea to further its interests. Compared to the past, current and future maritime operations require extended presence at sea. To carry out these tasks, intelligence, maritime surveillance and target acquisition capabilities, over-the-horizon targeting, the use of smart weapons and unmanned aerial vehicles, and national and multinational cooperation among military and civilian authorities are required. Own operations are protected with active movement and defence weapons.

The Army and the Air Force can support functions vital for maritime operations, protect naval units, and complement situational awareness and maritime targeting in sea areas.

Non-military maritime operations include clearing explosives, evacuations and search and rescue tasks. The Navy provides executive assistance to other authorities in these non-military tasks.

The majority of the Navy's tasks require a fleet of vessels. Laying mines, mine countermeasures, and anti-submarine warfare measures are tasks which are carried out at sea. They cannot be carried out with coastal troops, capabilities provided by other Services, small-sized fleet or outside of the target area. A high level of readiness must be maintained for the maritime tasks round the year and in all weather conditions.

"Surface-to-surface missiles and mines are the Navy's primary weapon systems"

Finland's freezing sea areas require the ability to navigate in ice.

Surface warfare

The Navy's surface warfare capability consists of the use of missile fire, sea mines, and the use of artillery and coastal missile fire. Surface warfare capability ensures deterrence against a potential aggressor.

The surface-to-surface missile system consists of missiles on various platforms and their command and control network. The situation in the target area is elaborated and the detected targets are categorised and identified so that fire can be directed at correct targets. Aircraft and an intelligence system support target designation. The data on the target's position is sent to missiles which are then launched. Firing units positioned on various platforms can be used according to different principles.

Coastal artillery is used to ensure territorial integrity, restrict the aggressor's activities and prevent their access to areas that are vital to own operations. Own mine-laying is protected with artillery fire which also prevents mine-sweeping efforts. Coastal artillery can also support coastal and land warfare. Mobile coastal missile units can be used for building focal areas to repel attacks.

The vessels use missiles in naval operations at all ranges. Long-range missiles are generally fired from ground launchers in a sheltered position on the mainland. An attack against the enemy's naval task units is generally conducted by concentrated missile fire from several units.

Anti-air warfare

Anti-air warfare systems on surface combatants are primarily for self-defence and to protect specified targets. Anti-air warfare capable units can be deployed as part of a larger air defence operation.

The Navy's anti-air warfare is one element in the national air defence system. Centralised command and control, multi-role fighters and, when necessary, the capabilities by other anti air warfare units support the Navy's air defence.

Anti-submarine warfare

In peace time, anti-submarine warfare is a part of the surveillance of territorial integrity and in time of crisis situations, submarines are denied access to areas that are critical to maritime operations and measures against vessels to be protected are prevented. Installed in the sea bottom, fixed surveillance systems are used to build a situation picture regarding sea areas that are vital for own operations. Situation picture is complemented by mobile surveillance units and underwater search carried out by surface combatants.

Effective anti-submarine warfare requires up-to-date intelligence, real-time surface and underwater situation picture, constant high readiness to repel and avoid submarines in threatened sea areas and the ability to operate in a target area for long periods of time without interruption. In the Finnish sea area, sea mines, depth charges and torpedoes are used to deny submarines freedom to operate.

Mine countermeasures

Mine countermeasures ensures that the fairways and sea areas that are vital for naval operations and maritime transport are free from mines. Successful mine countermeasures operations require a good knowledge of the sea bed and underwater conditions and therefore the sea bed below the most important fairways and operational areas should be surveyed already in peace time. It will then be easier to identify any changes in the sea bed targets and, as a result, possible mines and explosives can be destroyed or avoided. Surveillance units capable of operating in the coastal areas and the archipelago and special structure, low signature mine countermeasure (MCM) vessels which tolerate underwater explosions are primarily used for mine warfare.

Mine-laying

Sea mines create a preventive threshold against attacks. They are used to protect own naval units and merchant shipping, and to restrict the enemy's operations and prevent their access to sea areas that are important for us. Mine-laying is effective in denying the enemy its freedom of operation, closing fairways or sea areas and countering surface combatants and submarines.

As a rule, mines are stationary obstructions and attempts to clear them can be prevented with artillery and missile fire from coastal troops and surface combatants. Surface combatants and auxiliary vessels designed for year-round operations by the coast, in the archipelago and on the open sea are primarily used for mine-laying operations.

Finland has a powerful mine weapon with a variety of mines. Influence mines detonate on sensing noise, pressure or other changes caused by vessels. Contact mines detonate when they come into direct contact with vessels. Mines can be laid in a small area in clusters or in larger areas in a mass. Since mines are heavy, the vessels that carry them must have enough loading capacity.

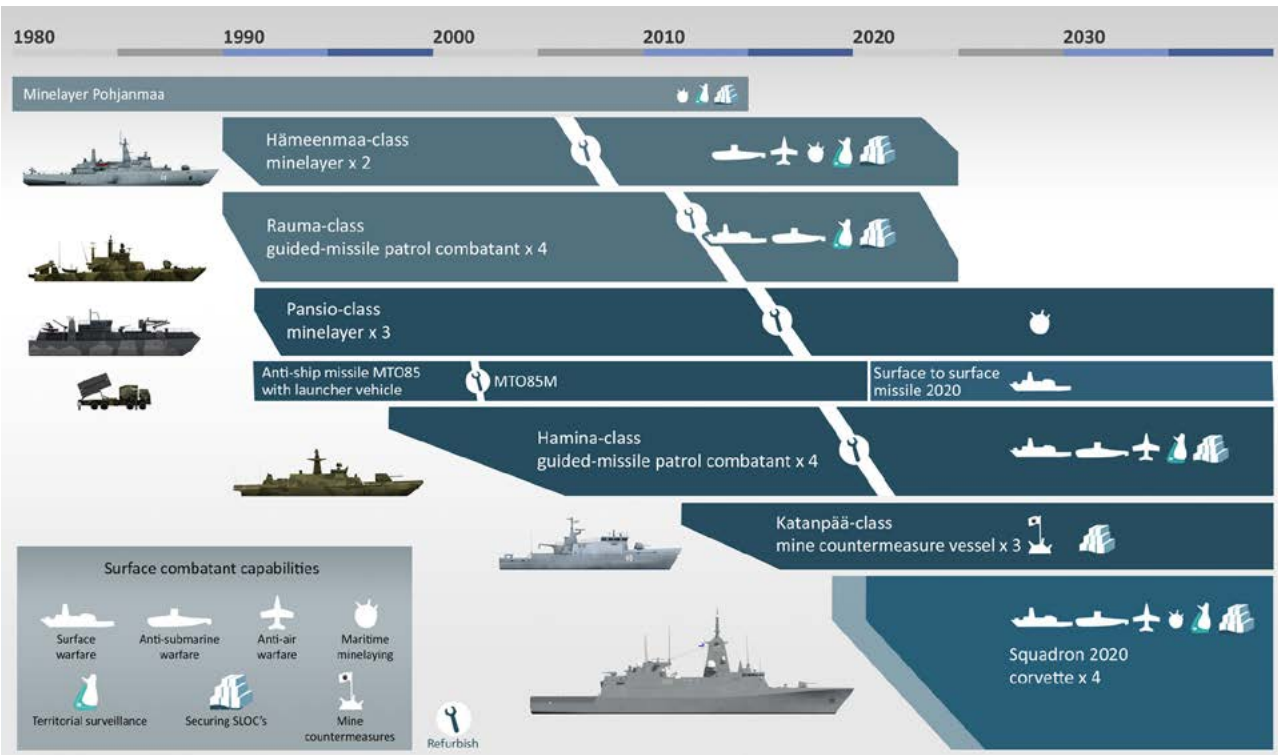
Squadron 2020

The vessels of the Squadron 2020 project will form the backbone of maritime defence for the Defence Forces in the future; their capabilities are planned to be used into the 2050s. The main particulars of the vessels will be the ability for year-round and long-endurance presence at sea in all weather and ice conditions of the Baltic Sea, command and control of maritime operations, surface warfare in the open sea, mine-laying at sea and anti-submarine warfare. The capabilities to be procured through the Squadron 2020 project are based on the statutory tasks of the Defence Forces and the estimated requirements of the future operating environment.

Changes in the Navy's vessels

Minelayer Pohjanmaa has already been decommissioned, and the four Rauma-class PGGs and two Hämeenmaa-class minelayers will reach the end of their service lives in 2022-2025. As a result, the Navy's capabilities will significantly decline by the mid-2020s. The ship classes have been refurbished once and no cost-effective solutions have been found to extend their service life.

Rapid technical development requires continuous efforts to maintain the surface combatants. Warships can be maintained in a cost-effective way for about 15



The life cycle of surface combatants is generally about 30 years. The vessels are designed for particular tasks. The development of maritime capabilities into the 2030s is shown in the picture. All ship classes have their own roles and together with anti-ship missile batteries and coastal troops they form an entity that carry out the Navy's tasks.

years after which they need to undergo a major refurbishment to maintain their performance. A major refurbishment generally means renewing expensive sensor and weapons systems either partially or completely. Communications and navigation equipment, machinery and plumbing, and possibly parts of the hull, are renewed in the vessel itself. The costs of technical maintenance and upkeep begin to increase significantly the nearer a warship is the end of its life cycle. Technically speaking, after the renewing and refurbishment process a warship generally has another 15 years of cost-effective life cycle.

After 2025, the Navy's surface combatants will consist of the new Squadron 2020 vessels, refurbished Hamina-class PGGs and Pansio-class minelayers, and Katanpää-class mine countermeasure vessels. The refurbished Hamina-class PGGs will retain their current capabilities. Fitted in connection with the refurbishment, a light torpedo system will enable the ship class to engage in anti-submarine warfare. The endurance and sea-going capabilities significantly limit the performance of the Hamina-class PGGs outside of the archipelago in ice conditions and during rough sea. The life cycle of the Hamina-class PGGs will end in the 2030s. Minelayers improve our mine-laying capability and mine countermeasure vessels ensure that the network of channels used by own surface combatants and merchant ships will be navigable. All ship classes have their own roles and together with anti-ship missile batteries and coastal troops they form an entity to respond to naval tasks.

Capability requirements on the Squadron 2020 project

The long-term plan of the Defence Forces and the related research lay the foundation for developing the defence system. The critical capabilities of maritime defence and their development have been defined to be part of this entity. The Defence Forces' planning has foreseen the ageing and decommissioning of the vessels.

As the vessels of the Squadron 2020 project will take part in the surveillance and safeguarding of territorial integrity, they are required to be able to

- detect, locate, identify and track surface and aerial targets and to detect, locate and track underwater targets;
- build and distribute a situation picture;
- warn and engage submarines, surface vessels and aircraft;
- command and control naval task units and aircraft;
- conduct long-term naval operations on the open sea in all seasons.

The vessels are used to counter attacks from the sea. In addition to the above, the vessels must be capable of:

- using the cover provided by the archipelago and the Navy's coastal units in their own operations;
- mine-laying in all conditions;
- carrying out intelligence and target acquisition tasks;
- engaging the enemy's surface combatants.

"All ship classes have their own roles and together with anti-ship missile batteries and coastal troops they form an entity to respond to naval tasks."

The vessels of the Squadron 2020 project will take part in safeguarding maritime transport in cooperation with national and international authorities. Depending on the situation and the nature of threat, the vessels will be used to safeguard maritime transport either individually or as a naval task unit. Apart from the above, the vessels are required to be able to

- maintain sufficient speed while operating among the commercial traffic in all conditions;
- maintain sufficient surveillance and countering distances so that also the operations by the ships to be protected can be safeguarded;
- be internationally interoperable.

The capabilities of the Squadron 2020 vessels can be used to support other authorities for example in maritime search and rescue, radiation control and demanding military tasks that require executive assistance.

The vessels can be used to carry out maritime crisis management tasks. The level of requirements for international tasks and the ability of the vessels to take part in a particular operation will be assessed on a case-by-case basis.

In the future, the Navy's Squadron 2020 vessels will be the only capability that are able for year-round and long-endurance presence at sea while creating deterrence against the use of military force in the air, on the surface, underwater and on the ground.

The Squadron 2020 concept

Determined research and development work on the Squadron 2020 project started already in 2008. At that point several studies were initiated with the aim to develop and, to an extent, create a capability in the Finnish industry and research institutes to design a modern surface combatant and conduct supporting analyses. The research work concentrated on naval engineering because it was seen as an area where, with the Defence Forces' limited research input, it would be possible to achieve significant cost and capability benefits for the future project.

The most important research subjects included the vessel's vulnerability and self protection, underwater influences and stealth above water, and the exceptional requirements that the conditions in the Baltic Sea set for a surface combatant, in other words the ability to navigate in ice and shallow waters. Although the main part of the research has been conducted in Finland international cooperation and exchange of information has played a significant role in many areas. Foreign expertise was needed in particular for underwater hydrodynamics and propeller design.

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The hulls of the already decommissioned Helsinki-class PGGs have been subjected to extensive tests. The results can be exploited in the design of a damage-resistant surface combatant.

In the project's initial phase, different vessel alternatives were studied as to their number and size for different scenarios while taking into account the other naval capabilities. Comparisons were made among different combinations of PGGs, corvettes, mine layers and patrol boats.

The variables being assessed were:

- Capability: how well are capability requirements met? What kind of a strike capability does the combination have?
- Operational usability: how well can we make use of our own support base? In what circumstances are we capable of operating?
- Factors affecting life cycle: what is the procurement cost of vessels? Maintenance costs? Can the vessels be serviced in Finland?
- Feasibility and framework conditions: what is the number of crew the combination in question requires? Is there a technical risk involved? Is there enough national expertise for procurement? Can growth potential be incorporated into the decision?

Warships are required to display different characteristics to carry out different tasks. For example, anti-submarine warfare may require cooperation among four vessels and therefore each one of them must have required capabilities. Mine laying at a certain stage of a crisis may require that three vessels have mine-laying capacity. A missile attack against a particular area may require several units. The best performance for each war fighting area could be achieved by building a class of ship for each task. However, this would not be feasible since costs would be many-fold to both procurement and maintenance and there would not be enough Navy personnel either. The type of operations that the Navy is involved in are very much dependent on the situation. It is possible that for example mine laying or anti submarine warfare would only be needed at a certain stage of a crisis at hand or not at all and then vessels that were built for this type of tasks would not be needed.

When compared, vessels that were optimised for one or two tasks or a combination of them always yielded a result that was not feasible. After evaluating several options, a decision was made on four multirole corvette-class surface combatants which could

SHIP CLASSES

The classification of surface combatants is based on established titles but the definition of ship types is inaccurate:

Battle Ships	30 000 - 65 000 t
Cruisers	10 000 - 25 000 t
Destroyers	4 000 - 10 000 t
Frigates	2 500 - 6 000 t
Corvettes	600 - 3 000 t
Patrol Vessels	<1 000 t

In the classification, destroyers are regularly used as the basis for definition after which other surface combatants are defined. Frigates have lighter weapons than destroyers but they can be almost as big in size.

Light frigates or corvettes are smaller and their capabilities are more modest compared to actual frigates. In Europe 'corvette' often refers to surface combatants that are smaller than all other frigates but larger than patrol vessels.

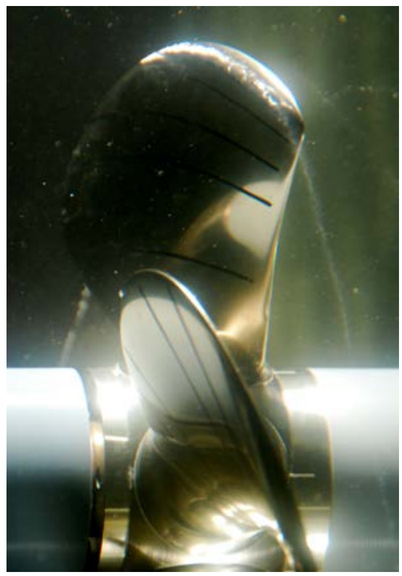
combine the required features. The vessels will be capable of performing several tasks at the same time and changing their operations flexibly, depending on the situation. They will be able to operate independently or as a part of a naval task unit. A task unit may consist of different types of vessels.

The vessels need to be somewhat larger than before to meet the requirements on the capacity for carrying mines, the ability to navigate in ice and speed. They must be capable of long-term operations during rough sea and their top speed must exceed that of modern merchant ships so that they will be able to maintain operational manouvering capability while securing SLOCs.

The new vessels must also be able to benefit from the protection offered by the fairways of the Finnish coast. The Finnish archipelago is the key basing area for the Navy. Even if the designed vessel size has increased compared to existing mine layers, they will be capable of operating in the fairways in the archipelago and relying on the dock structures in use.

The Navy's presence in more than one operational direction will be possible with the four Squadron 2020 vessels. In fact, this can be regarded as the minimum number of new vessels through which the Navy can establish capabilities to meet the demands of its tasks.

Model tests are carried out to ensure that the hull shape is suitable for icy conditions.



Cavitation tests are used in designing propellers.

Procurement of vessels

Design of vessels

In the initial phase it was recognised that this type of new vessel with the required capabilities did not exist. The vessels on the market were not capable of mine-laying and navigating in ice. To gain access to special studies and estimates on this type of vessel, domestic and foreign design agencies were contacted. The purpose was to define a surface combatant that met the minimum user requirements as to size, carrying capacity, being fitted with equipment, and was feasible as to the price of investment.

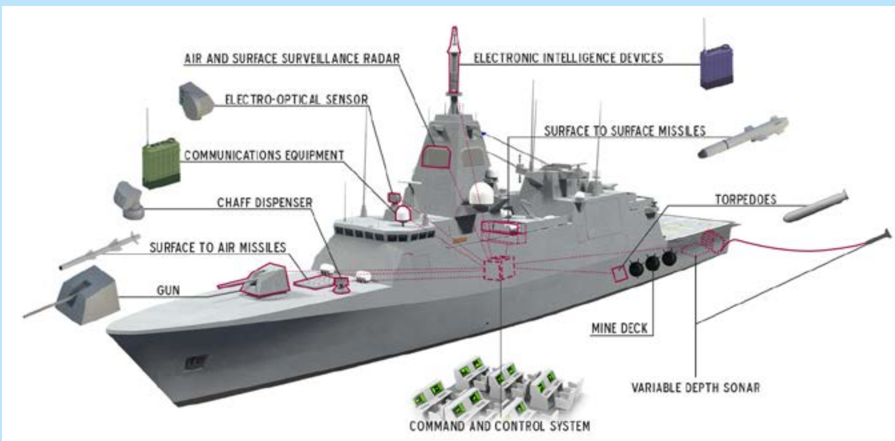
In ship design, to ensure a feasible and safe solution the vessel's main measurements, displacement, and the equipment to meet the task's requirements are coordinated. In addition to user requirements, the question of crew and the demands of the operating environment there are a number of international and national regulations concerning maritime transport and safety at sea. Furthermore, the requirements arising from the use and positioning of weapon systems and damage tolerance are highlighted in the design.

The purpose of consecutive, revised design cycles is to reach a balance between requirements that are often opposite to each other. Each design cycle aims at establishing something for the design basis and if something in the bases changes the design process has to go back a few steps.

For a warship, the requirements arising from mine-laying and winter navigation are rare in the international context but they are essential for the Finnish Navy to fulfil its tasks. These requirements played a major role in the vessel's design basis; to carry mines, the vessels shall have a covered space or a mine deck as well as enough carrying capacity and stability for a load weighing several tonnes while the ability to navigate in ice imposes constraints for the hull shape and structures. These requirements have not been incorporated into existing ship designs.

A combat system is an entity which consists of sensors, weapons, command and control systems, and communications systems. A war ship's combat system is always designed for a specific ship class. Subsystems fitting for the intended purpose are procured for the vessel and they are integrated to form a compatible system of systems. The core of the combat system is the combat management system into which weapons and sensors are integrated.

A vessel's combat system is in the core of its real capability.
A combat system consists of weapons, sensors, communications equipment and a combat management system.



How vessels are procured

Surface combatants are in practice always tailored to customer requirements. Contractors have different demands and the systems to be fitted to vessels can be selected on different criteria; national interests often play a strong role.

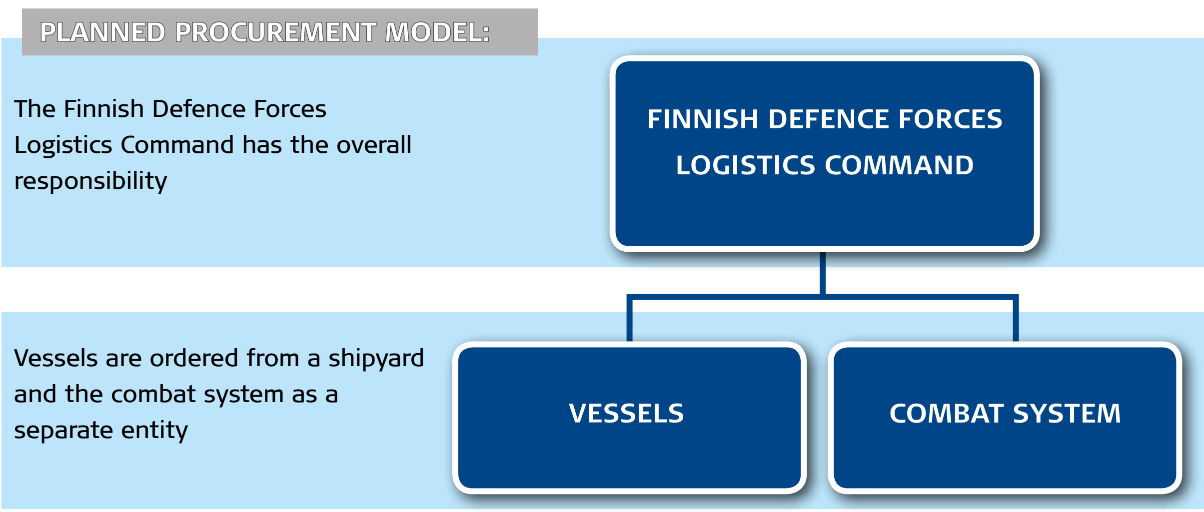
The overall procurement of vessels can be organised in different ways. For example, vessels and combat systems can be ordered as a single entity from one supplier on a turnkey basis as a so called Prime delivery, or the procurement can be divided in smaller units to be delivered by more than one supplier.

Prime deliveries are generally offered by large shipyards manufacturing warships; in addition to shipyard expertise they also have strong expertise in combat systems. In Prime procurement, the supplier runs the entire risk in relation to the project as stated in the contract. The most important benefits here are simplicity, clarity and, for the customer, and a smaller need for personnel. The greatest disadvantages in this model are its high price and lack of flexibility with regard to the customer's special needs and any changes during the project.

In recent years, the Finnish Navy's large projects have been carried out in line with the Prime principle. Completed or still on-going projects include, for example, a mine countermeasures vessel project, the upgrade of Rauma-class PGGs and the upgrade of Pansio-class minelayers.

Another way is to divide the procurement among different contracts. By dividing a procurement into smaller parts the contractor can achieve time and cost savings. This is a more flexible way as the contractor can then have more influence on the contents of deliveries. This model naturally requires that, to cope with the work load, the contractor arranges to have necessary personnel resources which in the Prime delivery would be bought from the supplier. In the divided model the customer inevitably runs part of the risk which, however, can be managed and reduced by keeping to the existing technical solutions and specifying clearly the responsibilities of the suppliers. The best way to ensure that the expertise required by security of supply will increase in Finland is to use this model.

The divided model was in the past the main way to procure surface combatants. The following have been



procured in this way: Hämeenmaa-class minelayers, Rauma-class PGGs and Hamina-class PGGs.

Almost all of the Navy's vessels have been constructed in Finland. The most recently ordered mine countermeasures vessels were, however, constructed overseas and therefore there is no recent experience of new construction ships at Finnish shipyards. As the Finnish defence industry is small and the domestic market is limited it is not possible for a shipyard to concentrate on constructing surface combatants only. Yet Finnish shipbuilding is appreciated for high-quality work and its ability to build and maintain special vessels.

In addition to shipbuilding, Finland has succeeded in maintaining high-tech industries. In the shipbuilding context, this could mean system or component deliveries and, possibly, integration tasks. Ship design, hull construction, equipment and system installation can be done in Finland but almost all combat system deliveries are by foreign suppliers. The role of domestic industries can be directed by means of materiel policy.

The plan is to divide the Squadron 2020 project into two entities: the vessels will be constructed in Finland on a separate contract while the combat system to be installed on the vessels will be procured on the basis of tendering. The supplier of the combat system will have the responsibility for sensor, communication and weapon systems integration. In this procurement model, the Defence Forces will be responsible for coordinating two main contracts and for successfully harmonising technologies. The key elements of project management, design and critical expertise will remain in Finland.

The goal of project quality assurance is to provide proactive support and ensure successful implementation of tasks and a traceable and transparent decision-making process. The quality and progress of the Defence Forces' projects are controlled through service life audits. In addition to this, the Ministry of Defence consults an independent expert organisation for quality assurance.

PGGs from three decades, built in Finland.
Helsinki-class (left) is already decommissioned, Rauma-class has been refurbished and will be phased out in 2022-2025 whereas Hamina-class continues in readiness into the 2030s.

Requirement on security of supply

The materiel performance in the Defence Forces is secured by procuring defence materiel which is suitable for the tasks and internationally compatible. Security of supplies must be ensured during the entire service life of systems. Similarly, the materiel vital for national defence and the integration, maintenance and service capabilities of systems critical for the Defence Forces performance must be ensured also in emergency situations.

Finland must be capable of maintaining the Squadron 2020 vessels in Finland since they will be an important element in the Defence Forces' performance and the procurement will be linked to key national security interests. Using proven solutions and standards generally in use is the best way to create this capability in the construction phase of vessels. The companies that take part in the construction of the vessels will develop expertise in different systems; this will later prove useful for maintenance. Maintenance capability which will be built in Finland can also be created by means of industrial participation arrangements.

Finnish shipbuilding industry is among the world's best and enjoys positive prospects after the many changes a few years ago. For Finland's maritime cluster, effective planning, management of the sub-contractor chain and adherence to schedules are the key components of competitiveness. There are several competent ship design agencies in Finland and expertise in this area is strong.

Legislation on the procurement of defence materiel

Defence procurement is carried out in accordance with the Act on Public Procurement in the Fields of Defence and Security (1531/2011). The Act implements Directive 2009/81/EC on the coordination of procedures for the award of certain works contracts, supply contracts and service contracts in the fields of defence and security (the Defence and Security Procurement Directive). In addition to the Act, defence procurement is guided by the defence administration's procurement instructions.

In terms of central government finances, all procurement must be made as economically as possible, taking into account service life costs and the state's key security interests. Openness, impartiality and non-discrimination are the basic principles in procurement. As a rule, defence materiel, construction, partnership arrangements and other services are competitively tendered in line with the Defence and Security Procurement Directive. In some cases, however, Finland's key security interests may require derogation from the above-mentioned principles, especially in situations where the goods or services in question are connected with safeguarding the state's key security interests, the protection of classified information, critical technologies, strategic competences and ensuring security of supply.

Article 346 of the Treaty on the Functioning of the European Union (TFEU) is a derogation article in the Treaty on the European Union that grants a member state the right not to follow the EU regulations if protection of the state's key security interests so requires. As far as defence materiel is concerned, it is possible to invoke derogation in cases where procurement in observance of the principles of transparency and non-discrimination as laid down in the Defence and Security Procurement Directive is not possible.

Industrial cooperation is one of the tools available in procurement policy and an obligation relating to industrial cooperation can be imposed if in key defence procurement contracts the conditions of Article 346 of the TFEU are met in terms of national defence and security. Based on a case-specific assessment, this obligation is imposed when the leading principle is to safeguard Finland's key security interests, for example by striving to safeguard the availability of critical technology in all conditions.

The Squadron 2020 project is associated with security interests that are central in terms of national defence, because it is not possible to design and build the system without knowledge of the maritime defence capabilities. The project involves classified operational requirements, and related information on these will be handled during the procurement process; disclosure of this information would cause significant damage to national defence. The nature of this information means that if the procurement was carried out in accordance with the Defence and Security Procurement Directive, the information could not be secured in an adequate and credible way. Supplying such information is, however, a prerequisite for the supplying company to be able to submit a binding offer and, later, to deliver a service in line with the capability requirements. It is considered that implementation of the Squadron 2020 project requires a derogation permitted by Article 346 of the TFEU in order to protect Finland´s key security interests.

The Defence Forces' units and weapon systems with the highest capabilities and deployable fast and flexibly, such as the Navy's surface combatants, can be used to proactively raise the threshold to use force and, when necessary, to launch a counter attack from a high level of readiness in peace time.

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Puolustusministeriö
Försvarsministeriet
Ministry of Defence

Eteläinen Makasiinikatu 8
PO Box 31
FIN-00131 HELSINKI, FINLAND
Tel.: +358 295 16001