

Lost in Transition

The Swedish Navy and air power in the interwar years

by *Petter Wulff*

Resumé

Det svenska flygvapnet bildades 1926. Därigenom omvandlades ett system bestående av två organisationer – armén och flottan – till ett trepartssystem. Det var en ny organisatorisk mix och för de båda gamla organisationerna uppstod frågan, hur de skulle anpassa sig i kampen för sin andel av försvarsbudgeten. För armén var det fördelaktigt att se flygvapnet som en konkurrent till flottan, där den nya organisationen följaktligen borde finansieras huvudsakligen från flottans budget. Flottan såg förstås sin relation till flygvapnet på annat sätt. Nyckelordet var där samarbete. Samarbetetanken materialiserades i ett flygplansföresatt fartyg. Det var i sig ett belägg för samarbetsintentionerna. Fartyget var också en potentiell plattform för experiment, där man kunde undersöka och utveckla intentionerna. Men flottan kom att genomföra mycket lite i den vägen. Inom ett decennium hade tanken på ett nära samarbete avvecklats i och med att fartyget omvandlades från att utnyttja den tredje dimensionen (luften) till att försvara sig mot hot därifrån.

THE SWEDISH AIR force was formed in 1926. Thereby a system of two military organizations – the Army and Navy – was supplanted by a triangular system. It was a new bureaucratic set-up, and for the old organizations the question arose how they should adapt in competing for their share of the military budget.

To the Army it was advantageous to see the Air Force as a competitor of the Navy, with the implication that the new organization should be financed mainly from the Navy budget. The Navy, naturally, saw its relationship with the Air Force in another light – one of cooperation. The cooperation idea materialized in an aircraft-carrying vessel. It was in itself evidence that naval vessels and aircraft could co-exist. It was also a potential platform for experiments to further investigate and extend the cooperation. But the Navy did very little of this. Within a decade the link of cooperation broke down,

as the aircraft carrier was modified from a pro-aircraft to an anti-aircraft vessel.

Here it will be asked what was the naval standpoint and how did it relate to technological developments.

Theoretical underpinnings

The approach employed in this paper relies a little on organizational theory and more on a theory of technology. Organizational theory tells us that an organization seeks to keep up its size and economy. This seems to be true not only of profit-maximizing private enterprises but also of public administration bodies.¹ Thus, a public body strives to retain – and if possible increase – its share of public expenditures. In the situation discussed here, three administrative bodies were to share what had formerly been shared by just two of them. This fact shaped the arguments and decisions of the body treated here (the Swedish Navy).

The central decision of the story presented was to construct a complex piece of technology, an aircraft-carrying system. Here an approach underpinning the analysis is based on a theory called Social Construction of Technology (SCOT). It was developed in the 1980s as a reaction against technological determinism – that is, a reaction against the belief that certain technologies could or should not be stopped. Determinists often referred to development trends and cost-effectiveness calculations as proof of the inevitability of certain technological developments; for instance, towards a car-oriented transport system or nuclear power.

SCOT rejected the determinist idea, saying that a new technology is not developed just because it must be or is more cost-effective than its predecessor or other alternatives. Instead the choice of technology is influenced by the social or cultural environment where the development takes place. In the words of two of its proponents the fundamental message of SCOT is that "technology and society are entangled together".²

In this paper one tenet of society stands out as especially entangled with the technology treated. It is organizational self-interest, which distorted the defense potential of the technological system formed by the aircraft-carrying vessel and its aircraft. It was not the engineering of the component objects that was at fault, but they failed to form a functional whole. The focus on system rather than individual objects is quite in line with SCOT; indeed it has been suggested that the approach should be called SCOTS, with the last letter standing for "Systems".³ We will see in the following how the aircraft-carrying system came to be quite cost-*ineffective* and short-lived because of an entanglement, where the Navy's rivalry with the Army came in the way of a sound national problem analysis.

A traditional view is that public technology – which is considered in this paper – is assumed to be the result of a requirement formulated by the responsible authority, while private technology is seen as presented to the market by a private (individual or collective) producer. Although this distinction is an oversimplification, disregarding interactions between producer and user, SCOT might have done more to analyze how far acquisition of a technology by an economically strong user mirrors technology acquisition on the private market, where each user is economically weak.

However, as a whole SCOT provides a well-established explanation why technological systems can have odd characteristics.

Connections to earlier research

The Swedish armed forces were under investigation and debate during much of the era between the World Wars – both in the 1920s and the 1930s. The investigative period in the 1920s has been treated by Wieslander.⁴ He describes how officers and other interest groups acted to prevent cuts in budgets and personnel. The next great investigative effort, in the first part of the 1930s, has been looked into by Cronenberg.⁵ He has clarified how a group of army officers with new ideas came to play a key role in the political decision-making process. Cronenberg has also outlined the general strategic ideas of the period as part of a larger survey on this theme.⁶

The Air Force development of the period is treated by Böhme (1988), with an emphasis on organization of the Air Force and of aircraft production.⁷ A dissertation by Norberg on the Air Force of the 1930s has a similar approach.⁸ Air Force doctrine is treated by Böhme in a text describing the

change around 1930 from an air defence to a bombing profile.⁹

The Interwar Navy, which is the main actor in this article, is the focus of a dissertation by Berge.¹⁰ He goes beyond a simple concept of rationality in discussing how proponents of what he calls “political rationality” came to oppose an older school of military rationality among Navy officers. In this article I have picked up the idea of inter-service rivalry, which is prominent in Cronenberg’s 1974 and 1977 texts (and is also mentioned by Wieslander). It is recognized as a driving force behind some key decisions made by the Navy; now and again overshadowing the military rationality mentioned by Berge.

In some contrast to the literature mentioned I have laid emphasis on the role of a technological system. The objective is to find reasonable motives behind technological choices made by the Navy. This is an ambition also behind an earlier article of mine, about Sweden as a bombing nation in the 1930s.¹¹ Actually, the article at hand can be seen as complementary to the earlier one, where the inter-service competition was seen from an Army/Air Force perspective.

Navy officers’ opinions at the time are primarily taken from the Navy’s journal (*Tidskrift i Sjöväsendet*).

The Air Force a political favorite

After the First World War Sweden experienced “a final democratic breakthrough”,¹² resulting in universal suffrage and governments based on parliamentary strength. The new and broader voting collective helped raise the Social Democratic Party to power. Being a new political force the party was less bound to military authority and went against the professional military opinion to gather a

parliamentary majority for the creation of a separate Air Force.¹³

It has been said that there were primarily economic reasons behind that decision.¹⁴ However, although in current prices the defense budget fell by about 20 % in the following decade, the drop was only about half as great in real prices.¹⁵ But the Air Force was not just seen as a means of reducing military spending. The new service might have been a political favorite because it could be part of the peripheral defenses. During the World War the Navy was seen to have done a good job on the maritime periphery.¹⁶ In a possible new war in Europe, an Air Force could help the Navy to keep hostilities outside of Swedish territory. The Air Force decision also represented a belief in modern technology. In 1923 a plea for a “Machine

Army” had evoked a major debate, including calls for a stronger Air Force.¹⁷ The Machine Army debate could have inspired and supported the position of the Social Democrats.

With the defense decision of 1925 the long-established Army-Navy system was expanded to include the Air Force as a third member. Its creation was the work of the politicians. Now the Army and Navy had to react to the new organizational reality.

Army: Air Force instead of Navy

In 1925 a number of Army regiments were decommissioned and there was a sense of crisis in the organization. For some the conviction grew that the solution lay in a radical reorientation of the Army’s position and preferences. The established attitude had been to lean on the political right wing and demand large budgets. With the rise of the left, in the form of the Social Democrats,

to parliamentary power, this was becoming increasingly problematic. The new group – often called the NMT group after the initials of its journal (*Ny Militär Tidskrift*) – no longer objected to political restrictions on defense spending. To compensate for economic cutbacks, the group tried to retain or increase the Army's share of the defense budget. Even though it was not admitted publicly, the group's anti-Navy policy is as clear as its epithet of being "the Scourge of the Navy".¹⁸

The Air Force could be used as an instrument for this purpose, as it could possibly take over (part of) the peripheral defense and do it at a lower cost than the Navy. This required an Air Force with an emphasis on bomber aircraft. Internationally it was an era of great belief in, or fear of, bombers – with the Italian general Douhet as the one strategist possibly of greatest importance for the Swedish development. But there was also a Swedish doctrine developed to motivate the acquisition of a bomber Air Force. Its starting point was that the main threat to Sweden was the bombing of urban centers. What the Air Force should do to keep down this threat was to bomb the bases of the enemy bombers.¹⁹ It was, in other words, a counter-bombing theory (not unlike the counter-force strategy of nuclear deterrence in the Cold War).

The NMT group got key positions in the 1930 Defense Commission, where the Army and Air Force secretariats were headed by NMT men. One of the special investigations carried out during the five years the commission worked concerned the position of the Air Force in relation to the Navy.²⁰ The task here was to carefully consider to what extent a Swedish Air Force could "completely take over the duties, which have hitherto been assumed to be of a predominantly naval nature".²¹ Even if there was no reason-

able chance of eradicating the Navy, there were expectations of substantial cuts in its budget. The money saved by slimming the Navy should instead go to the Air Force "primarily to enlarge the independent bomber units".²²

The Navy was under pressure. How should it react?

Navy: Air Force and Navy

The Navy could have argued like the Army, saying that the Air Force could take over part of the Army's job of defending Sweden's land territory. They didn't do so. Instead the Navy argued that aircraft should be seen as complements to ships. A Navy plan of the mid-1920s described aircraft as "an indispensable, fully integrating, part of the sea force".²³ In other words, it was seen as a necessary complement to the Navy. A decade later, when a new defense decision was about to be taken, it was still plain and clear that the goal was "that the sea interests should be protected by Navy and Air Force in cooperation".²⁴ The formula should not be "Air Force or Navy" but "Air Force *and* Navy, together forming our outer line of defense".²⁵

The arguments for Navy-Air Force cooperation were backed up by a solid piece of technology in the form of Sweden's one and only aircraft-carrying vessel. It had been included in the 1927 Navy Plan and became sea-borne seven years later. It was an "aircraft-carrier-cruiser", a compact vessel with an aircraft runway of just over twenty meters (and less when folded), necessitating a catapult for take-offs, and a crane to lift aircraft back on board after they had landed on the water. There were no more than six aircraft on board.

Still – or maybe because of the compact solution – there was a lot of pride in the vessel.

The catapult was seen as a “path-breaking construction”,²⁶ and the ship received praise from abroad for a technology of “remarkable cleverness”.²⁷

Now, if the key was cooperation, how did that translate into Navy practice? It was, in fact, cooperation on rather special terms, characterized by a technological preference for seaplanes and reconnaissance tasks. We will now look into these factors to see how they made the Navy get lost in transition to a three-service military system.

Seaplanes – losing ground

The Navy plan, presented in 1926, argued that the presence of aircraft operating with a naval force must be “permanent and immediate”.²⁸ This could only be accomplished by the use of planes capable of taking off and landing on water. Strengthening the belief in this technology, a 1924 report noted that seaplane performance was now on a par with the performance of wheeled aircraft. Furthermore, seaplanes were seen to have an unlimited development potential with regard to size, whereas heavy aircraft could not be expected to find sufficiently long airstrips on land.²⁹ Another argument raised in favor of seaplanes was their minimal demands on airport construction.³⁰

Pontoon aircraft could land in the immediate vicinity of an aircraft-carrying vessel and be lifted on board to be rapidly prepared for a new sortie. Also for other Navy aircraft, the bases should be adjacent to where the ships were,³¹ and pontoon aircraft could remain in coastal waters within shorter distance of the naval operation areas. Said to have minimal demands on construction work for air bases as well, seaplanes was the solution to develop.

The drawbacks of seaplane technology were given much less attention. For exam-

ple, an aircraft returning from a mission would normally need refueling and possibly a change of crew. If it had been on a bombing mission, it could also need new bombs. The logistical problems of getting fuel, people, and goods on board an aircraft on water as compared to one on land seem not to have been much looked into. A comment that seaplane stations demanded more of its personnel in peacetime compared to airports on land, suggested that conditions could be reversed in wartime.³² One argument for such a reversal was that seaplane airports were taken to be invulnerable.³³ That was not entirely true. Even if a runway on water would automatically and quickly self-seal after a bomb explosion, mines hidden below the surface could be a threat; and it might be a lengthy procedure to make sure no mines lay hidden under the runway. This was primarily a problem in shallow waters near the coast.

On the open sea another problem appeared. It was found that the vessel’s aircraft could only rarely land there, as the sea was normally too rough. Normal procedure therefore came to be that the carrier headed for the coast to pick up its planes.³⁴ This problem seems not to have been recognized at the planning stage, which is indicated by the fact that the machinery for lifting aircraft on board was designed for conditions where the waves were later found to make landings impossible. It was hoped that a “sail” dragged on the surface after the vessel would dampen the waves enough to make it a refueling station also for coast-based aircraft,³⁵ but there is no indication that it solved the landing problem.

More of an everyday problem was that when running on a sea surface, water might be sprayed all over the seaplane and place a heavy strain on propeller and engine axis.³⁶ Somewhat unexpectedly, even without

waves there could be a problem – it has been reported that taking off could then be difficult,³⁷ and landing, as well.³⁸

Bombers on board?

The idea that Sweden should build an aircraft carrier was first presented in a report specifying a shipbuilding program for the ten-year period 1928/29 to 1937/38.³⁹ It was not specified what kind of aircraft this vessel should carry, but naval weapons were discussed. Bombs dropped from the air was one type of weapon and it was compared to other weapons systems – guns, torpedoes, mines and depth charges. This indicates that the option of having bomber aircraft on board was considered.

The program report compared the various weapons systems with regard to range, precision, impact on target, and capacity for sustained action. In the following survey we will concentrate on the comparison between heavy guns and bombs. A ship's guns are said in the report to have a certain advantage over a bomb-carrying aircraft as the projectiles of the former impact on a target at a higher velocity. Guns are also said to have a greater potential for sustained action. So far, so good.

The comparisons of range and precision turn out to be more problematic. Range is measured in the report as the distance a projectile fired from a gun can travel, which is compared to the distance a bomb can fall. This way of comparing projectile and bomb range had been suggested in an earlier document, where it was called the weapon's tactical range.⁴⁰ It was a problematic concept for bomb performance, which is indicated by the comment in the report that attacks with bombs could be quite effective if dropped from a *short* range.⁴¹

Besides tactical range there was another concept – strategic range. It indicated how far away from a target a weapons carrier – a navy vessel or a bomber aircraft – could deliver its weapons (and return).⁴² Depending on which of the range concepts was used, bombing could either be seen as superior (strategic range) or inferior (tactical range). The Navy plan document chose to lean on the latter concept. With regard to precision the report simply states that the superiority of the gun is indisputable.⁴³ Before long the tactic of dive-bombing would make that a misleading statement.

The Navy's conclusions regarding bombing couldn't easily be accepted by naval airmen. They must have heard of bomb proponents in countries like Great Britain (Hugh Trenchard), the United States (Billy Mitchell), and Italy (Giulio Douhet). In Sweden a former Army officer (K A Bratt) had given much-discussed presentations about the terrible effects of bombing.⁴⁴ With bombing conceived as such a powerful tool, a serious discussion of a Swedish naval bombing capability would be expected.

The potential of naval bombing was actually discussed in a survey of military and civilian flying developments presented to the Royal Swedish Society of Naval Sciences. The survey discussed Douhet's idea of "air power" as an equivalent of "sea power" (and "land power"). The author found that, according to "sound military principles", aerial forces should be organized so as to attain maximum striking power. Therefore, the Air Force's first duty should be to engage in aerial combat or attack the enemy's formations on the ground.⁴⁵ These missions should be independent of Navy (or Army) operations, and it was stressed that "aircraft units of value for the air war should not be detached to secondary combat missions in cooperation with the other services, before the war

situation in the air has been stabilized”.⁴⁶ What this pointed to was a different kind of cooperation between Navy and Air Force, where an aircraft-carrying vessel was a platform for aircraft employing their weapons in a stabilizing way.

The more specific form of bombing with chemical weapons was also commented on in an article. In this kind of attack international experience was found to favor a combined operation by air and naval forces in which “complete cooperation must exist”.⁴⁷ In other words, here too, bombing was seen as part of the cooperative idea.

The more general of the surveys, which had introduced Douhet’s ideas, evoked an immediate and strong reaction. The survey was published with a statement from the Society of Naval Sciences saying that it did not share the opinions presented; neither in regarding the organization of the Air Force nor its strategic employment. This initial objection was followed by articles along the same lines; either with the comment that Douhet had carried his theses to “a far-reaching exaggeration”,⁴⁸ or that there was a flaw in his key concept, “Command of the Air”.⁴⁹ The critique was even extended to question the rationality of having a separate Air Force.⁵⁰

Some years later the Navy representative in the 1930 Defence Commission modified the no-bomb attitude, saying that medium heavy bombers should be equipped and crews trained to become fully capable of taking part in sea operations.⁵¹

Denying the use of dive-bombing

Within a year of the launching of the “aircraft-carrier-cruiser” a new way of using aircraft was introduced in Sweden. It was the dive-bombing tactic, where the aircraft made a

steep dive pointing its nose at the target on the ground. For maximum precision the bombs should be released late from a low altitude. In other words, the tactical range should be minimal. The experiments carried out showed promising results – promising, that is, from the bombing point of view.

A rough calculation can be made of how far east a vessel-borne bomber could have reached. The British Hawker Hart was a bomber version of the reconnaissance aircraft employed on the Swedish aircraft-carrying vessel. Its range has been given as 430 miles (690 km).⁵² The Swedish Defense Commission of the early 1930s says a light bomber should be able to bomb targets 250 km away.⁵³ The light bomber at that time was the Hawker Hart. So it could fly 250 km with bombs and return (without bombs), 500 km altogether. The 690 km reach would be the range attainable without any bombs.

The aircraft on board the vessel could not land from where they were catapulted. The return trip would have to go to Sweden – a distance that could be much longer than from the carrier to the target. To have enough fuel for the return trip the aircraft could therefore not reach targets more than 150–200 km from the vessel platform. Still, this could give an opportunity to attack a Soviet invasion fleet as far away as in the Gulf of Finland. It would have given “great advantages in exploiting the long and vulnerable approach from Kronstadt” that had to be traversed by the enemy.⁵⁴

The Navy saw it differently. An early reaction was that the dive-bombing technique was dubious as it implied “extreme strain on materiel and personnel”.⁵⁵ After experiments had shown the strains to be bearable, other concerns were brought up. A typical attitude was the recommendation to be extremely cautious when evaluating the experimental results.⁵⁶ Anti-aircraft guns

was an additional factor that would make it difficult for aircraft to aim at Navy ships. It was even claimed that ships could be more of a threat to bombers than bombers to ships.⁵⁷ The ships' speed would make the aiming still more difficult. Apart from that, modern naval ships with steel decks and sectioning systems were claimed to be "dive-bomber proof", that is unsinkable.⁵⁸ The experimental results against unprotected targets lying still were therefore denounced in Navy circles as misleading.

Reconnaissance – cooperation or support?

To successfully use its heavy guns, the Navy's ships needed early information about where the enemy was. It could be provided by aircraft. A reconnaissance role was probably envisaged when the Navy Plan concluded that aircraft were an indispensable part of any naval force.⁵⁹

In the contract for building the ship, its aircraft-related equipment (catapult, crane for lifting aircraft onboard, tank for aircraft fuel) was specified apart from its weapons systems (guns, torpedoes, and mines). This is in line with the conclusion above that bombing range and precision were seen to be inferior and therefore the question of bombs and bombers on board didn't need much consideration. Instead the aircraft system was aligned with the radio system – indicating that aircraft belonged among the ship's communications systems. It strengthens the idea that the system was viewed primarily as a system for conveying information to the ship (reconnaissance, fire control) – not to be used for dropping bombs (or torpedoes).

The equipment loaded on a reconnaissance plane would have weighed less than the weapons on a bomber or torpedo plane. That was an advantage on an aircraft carrier

with a catapult of limited capacity regarding aircraft weight. The Swedish carrier could only launch aircraft of up to 2.5 tons.⁶⁰ However, the plane used was designed to take the weight of an extra person besides the pilot, and the pontoons represented extra weight as compared to wheels. If instead the same plane had been used as a single-seater and equipped with wheels, around 150 kilos could have been saved and given a margin for loading bombs.

It was argued that aircraft should be capable of carrying out reconnaissance missions even to the most distant parts of the Baltic region.⁶¹ This would require a navigational skill that could best be obtained through training with the Navy.⁶² However, as radio navigation was introduced the need for navigational training subsided. In the mid-1930s the new technology was reported to be standard in civilian aviation.⁶³

The budget game

The Swedish Navy, like any organization, wanted to avoid losing economic strength relative to its competitor (the Army). When there was a shift from an Army and Navy defense system to a system including an Air Force, it was a challenge. We have seen what the Navy did to handle it. Figure 1 gives us the outcome of the budget game.

At the start of the interwar period the Navy's budget was half the size of the Army's. They both experienced cuts in the early 1920s. The transition to a new military system occurred in 1926 as a result of a parliamentary decision to create a single and separate Air Force out of the Army's and Navy's air forces. During the following years the Navy more or less kept its budget level, while the Army suffered further budget cuts. The situation was reversed with the new defence decision a decade later. With it came rising defense

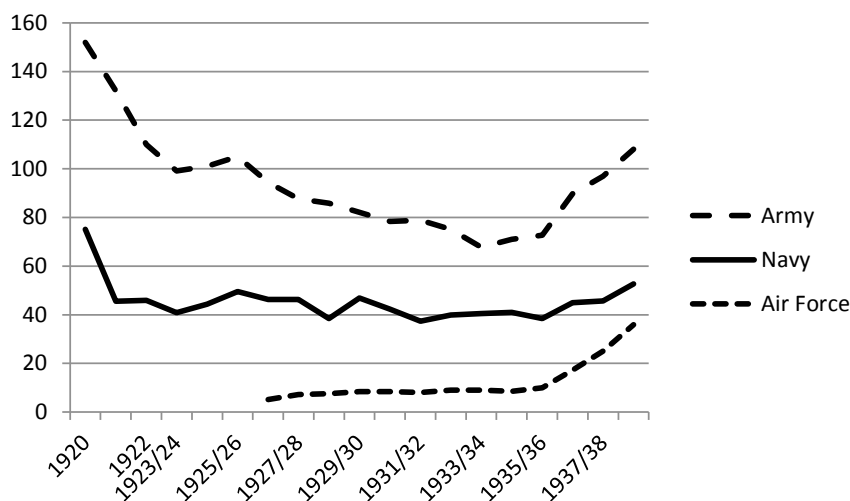


Figure 1. The relative budget strength of the services in the Interwar period (million Swedish Crowns, current prices). From: *Statistical Yearbook of Sweden*.

expenditures. During these final years of the interwar period the Army's economy expanded more rapidly than the Navy's. The period ended with the Army's budget once again being twice the size of the Navy's. Only this time the budget of the Air Force was almost on a par with that of the Navy.

Looked at from another angle, the Navy had a positive development (relative to that of the Army) during the years when its aircraft carrier was being planned. But more or less from the time the carrier was launched, the Navy's budget share fell back. Obviously, the political decision makers were not enough impressed with the Navy-Air Force cooperation to give it budgetary backing.

Actually, not even the Navy was convinced that the aircraft-carrying vessel was a blessing, as in the later stages of the 1930 Defense Commission work, around 1934 or 1935, a proposal was made to have the carrier converted into a pure gun-carrying vessel.⁶⁴

After a decade at sea the carrier was transformed. There was a proposal to have it

turned into a platform for fighter aircraft (on wheels). The idea was investigated, but the transformation was found to be too costly both in time and money. Instead, the carrier was transformed into an anti-aircraft vessel.⁶⁵ Its era as an aircraft carrier had come to a close much earlier than the 30 years predicted at the outset.⁶⁶

Why was bombing rejected?

Going from a two-service military system to a system with three services was a major transition. To keep up its share of the military budget both the Army and Navy had to include the Air Force in its calculations and doctrines. It was the Air Force's role in the peripheral defense that attracted the attention of both the competing services.

The Army wanted to use the Air Force as a tool against the competitor and thereby become "the scourge of the Navy". To this end bombers were promoted to be replacements for big Navy ships. The Navy, unsurprisingly, took another position, saying that it shouldn't

be a question of Air Force *or* Navy but Air Force *with* Navy. Cooperation should furthermore be “permanent and immediate”. The decision to build an aircraft-carrying vessel signaled that the Navy meant business with its cooperation doctrine.

But in the very shipbuilding program, where the vessel was presented, there was also a restriction introduced on Navy-Air Force cooperation. It resulted from a discussion of naval weapons, where bombs and ships’ guns were compared in a number of respects – range, precision, impact on target, and capacity for sustained action. The range comparison, that is, how far the weapons could reach, was made in a peculiar way. A ship’s guns were said to reach 35 km. That was its so-called tactical range. Its strategic range was how far the gun-carrying ship could go. For most naval weapons the strategic range played no part in the comparison, as they were all launched directly from the ship. That was the case for mines, depth-charges and torpedoes (although the latter could also be launched from aircraft). With bombs, however, it was another matter. They were launched from aircraft, and the critical factor was how far the weapons-carrying aircraft could reach – in other words its strategic range. Therefore, if you had bombers and heavy guns on board, as you could have had on the Swedish aircraft-carrying vessel, it would be reasonable to compare the strategic range of the bomber with the tactical range of the vessel’s guns.

In the Navy program it was done differently. There the most relevant concept for the gun – its tactical range – was made the measuring-rod for bombs as well. The maximum altitude from which bombs could be released (a few km) was then seen to be quite inferior to the guns’ 35 km reach. This pro-gun way of comparing ranges strengthened the belief in the heavy gun as the main weapon of the

Navy and tended to make naval bombers a dubious prospect. Such conceptual formalism might have been (mistakenly) taken by the naval authorities as theoretical proof of the superiority of its guns. It is, of course, possible that the committee behind the Navy program quite consciously made a calculus with an anti-bomber bias to save the big ships with their traditional main weapon. Anyway, the treatment of bombing range restricted the possibilities of Army-Navy cooperation.

Bombing rejected, another role for the vessel’s aircraft had to be promoted to save the cooperation idea. The reconnaissance role fitted the Navy, as it was much less of a challenge to its ships. Instead this cooperation tended to make the Air Force an auxiliary arm to the Navy. That was an idea very far from air force ideas of the day, which saw the bomber as the most potent air component, but when a naval audience was confronted with an argument for bombing, it was rapidly rejected. (Similar thoughts, when presented in a more Army-related environment, got quite another reception and inspired plans for a bomber-dominated Air Force).⁶⁷

A mental gap had been created between the bombing and reconnaissance roles of the Air Force, but technologically there was no gap. Instead, more or less the same type of aircraft used for reconnaissance tasks on board the aircraft carrier, was used by the Air Force as a light bomber. Actually, it was the very type used in pioneering the dive-bombing tactic.

The dive-bombing potential against ships was diminished or denied by Navy representatives. The more the Army intensified its ambition to promote the bomber as an alternative to Navy (big) ships, the more the bomber came to be seen as a threat by the Navy. This precluded a broader view, where dive-bombing could have been considered

an asset in countering a Soviet invasion fleet. Dive-bombers launched from the aircraft carrier could have reached the narrow waters of the Gulf of Finland, where an enemy fleet would have been vulnerable. This was an option blocked by the Navy's identification of itself as a potential target instead of an ally of bomber activity.

With naval dive-bombing Sweden could have had an edge over its main adversary, the Soviet Union, as the latter's military culture was relying more on mass (bomber) action.⁶⁸ This should have made the tactic less of a concern as a threat, but such a perspective seems not to have been brought up. Somewhat ironically the idea of dive-bombing in Sweden had a naval origin. The tactic had been developed by the US Navy, where it was seen to have a number of advantages helping to make it a preferred mode of attack on enemy ships.⁶⁹

Only a decade after it had been launched, with a world war raging just beyond the borders, this symbol of Navy-Air Force cooperation was modified to fit a new role. By then the bomber doctrine of the 1930s had been replaced by belief in the fighter as the most important aircraft type, and there was a proposal to have the vessel turned into a platform for fighter aircraft. The idea was investigated but found not feasible. Instead the vessel became a platform for anti-aircraft guns. As the Navy switched from a pro- to an anti-aircraft vessel, it gave evidence of having been lost in the transition to a new military system.

Cooperation versus self-sufficiency

It has been said that, after World War II, the Baltic could be "completely dominated by landbased aircraft", and that the demise of Sweden's aircraft-carrying vessel therefore

was inevitable.⁷⁰ However, the alternative with sea-based aircraft had encountered problems even before the World War. What happened to that technology (and the bombing option) can be seen as an outcome of a timeless dilemma – whether to cooperate or be self-sufficient.

The Navy presented its attitude vis-à-vis the Air Force as one of cooperation. In fact it was a mixture of cooperation and self-sufficiency. The former was expressed as an immediate and permanent need for aircraft, and it was symbolized by the construction of an "aircraft cruiser". As it was a fairly compact ship, aircraft could not land on it. Instead aircraft should land on the water beside the vessel in order to be rapidly available again after landing.

However, the cooperative idea turned out to be impractical, as the open sea was not smooth enough for pontoon seaplanes to land on. In other words, the technological system was a dead end. The Navy would probably not have proceeded so far towards it, if its cooperative effort had included a working dialogue with the Air Force. There is no indication, however, that the Air Force was invited to present its views on aircraft carrier development, or the kind of aircraft to be stationed on board. Had there been a dialogue, it could have opened up for other tactical and technological options – like shifting to wheeled aircraft on board.

There was also a self-sufficiency part of the Navy's stance. It was based on "evidence" that ships' guns were superior weapons to bomber aircraft. Thereby opportunities of combined Navy-Air Force offensive action were ruled out (like the dive-bombing opportunity investigated here).

The author is a former defense analyst (FOI) and licentiate of technology (KTH).

Notes

1. There is no distinction made between the goals in the private and public sphere in, for instance, the survey by Ahrne, Göran; Hedström, Peter (ed.): *Organisationer och samhälle*, Studentlitteratur, Lund 2012.
2. Bijker, Wiebe E.; Hughes, Thomas P.; Pinch, Trevor (ed.), *The Social Construction of Technological Systems*, The MIT Press, Cambridge, Massachusetts 2012 (Anniversary edition), p. xxiii.
3. Ibid., p. xii.
4. Wieslander, Hans: *I nedrustningens tecken*, Lund Political Studies 5, CWK Gleerup, Lund 1966.
5. Cronenberg, Arvid: "Kretsen kring ny militär tidskrift", *Aktuellt och historiskt*, Stockholm 1974; *Militär intressegrupp-politik : kretsen kring Ny militär tidskrift och dess väg till inflytande i 1930 års försvarskommission*, Militärhistoriska avd., Militärhögskolan, Stockholm 1977.
6. Cronenberg, Arvid: "Säkerhetspolitik och krigsplanering" in Hugemark, Bo (ed.): *Neutralitet och försvar*, Militärhistoriska förlaget, Stockholm 1986.
7. Böhme, Klaus-Richard (translation: Thomas Munch-Petersen): *The growth of the Swedish aircraft industry 1918–1945 : the Swedish Air Force and aircraft industry*, Sunflower University Press, Manhattan, Kansas 1988.
8. Norberg, Erik: *Flyg i beredskap. Det svenska flygvapnet i omvandling och uppbyggnad 1936–1942*, Allmänna förlaget, Stockholm 1971.
9. Böhme, Klaus-Richard: "The Swedish Air Force Looking for a Doctrine, 1926–1934" in Böhme, Klaus-R; Linton, Carl (ed.): *Air Power. Doctrine and Technology*, Probus, Stockholm 1996.
10. Berge, Anders: *Sakkunskap och politisk rationalitet. Den svenska flottan och pansarfar-tygsfrågan 1918–1939*, Almqvist & Wiksell International, Stockholm 1987.
11. Wulff, Petter: "Self-Defence on Foreign Ground: Sweden as a Bombing Nation", *ICON*, vol. 14, 2008.
12. Norborg, Lars-Arne: *Sveriges historia under 1800- och 1900-talen*, Almqvist & Wiksell, Stockholm 1995, p. 94.
13. Op. cit., Wieslander, Hans: see note 4, p. 173; According to Böhme, Klaus- Richard (see note 9, p 13) it was primarily the Navy's opinion that was overruled.
14. Op. cit., Böhme, Klaus-Richard, see note 7, p. 14.
15. Bergstrand, Bengt-Göran: *PM angående svenska försvarsutgifter m.m.*, The Swedish Defence Research Agency 30/8 1984 (FOA, unpublished).
16. Hugemark, Bo: "The Swedish Navy – Auxiliary Force or Strategic Factor? The Navy in Swedish Security Policy 1809–1990", pp. 257–311 in Rystad, Göran; Böhme, Klaus-Richard and Carlgren, Wilhelm M.: *In Quest of Trade and Security: The Baltic in Power Politics 1500–1990*, Vol. 2, 1890–1990, Probus, Stockholm/Lund University Press, Lund 1995, p. 287.
17. Op. cit., Wieslander, Hans, see note 4, pp. 168–173.
18. Op. cit., Cronenberg, Arvid 1974, see note 5, pp. 102, 106–111.
19. Op. cit., Wulff, Petter, see note 11.
20. The Swedish War Archives, Helge Ljung's archive, vol 5, PM 26/10 1932.
21. The Swedish War Archives, The 1930 Defence Committee, F II, vol 6, document 56: p. 2.
22. Ibid., p 4.
23. *Betänkande och förslag rörande ersättningsbyggnad för flottan*, SOU 1926:34, K. L. Beckmans boktryckeri, Stockholm 1926, p. 45.
24. Strömbäck, Helge: *Sverige och Östersjön: en försvarspolitisk studie*, Marinlitteraturföreningen nr 40, Stockholm 1936, p. 124.
25. Hammargren, Henning: "Flygstridskrafterna och krigföringen i Östersjön", *Tidskrift i Sjöväsendet* 1934, p. 268.
26. Hammargren, Henning: "Årsberättelse i flygväsende", *Tidskrift i Sjöväsendet* 1937, pp. 132–133.
27. Hammar, H. G.; Hagman, T.: *Flygplanskryssaren Gotland*, Göteborg: Götaverken, 1935 (quote on p. 45).
28. Op. cit., SOU 1926:34, see note 23, p. 45.
29. Landquist, Axel Daniel; Tornberg, E.: *Flygvapnet och vårt sjöförsvar*, Marinlitteraturföreningen nr 27, Stockholm 1924, pp. 82–83.

30. Jarneberg, Eric: *F2-Hägernäs: Kungl. Roslagens flygkårs och Hägernäs historia*, Täby hembygdsförenings skriftserie nr 21, Borås 1987, p. 57.
31. Hammargren, Henning: "Flygstridskrafterna i sjökriget", in Blix, G.; Ekstrand, Y.; Wachtmeister, A. and Hammargren, Henning: *Taktiska spörmål. I*, Marinlitteraturföreningens förlag nr 35, Stockholm 1931, p. 67.
32. Giron, Marc, pp. 241-422 in *Betänkande med Förslag till ordnande av Sveriges försvarsväsende avgivet av 1930 års försvarskommission. Del VI. Särskilda yttranden*, K.L. Beckmans boktryckeri, Stockholm 1935, p. 373; Op. cit., Hammargren, Henning, see note 26, p. 206.
33. Op. cit., Hammargren, Henning see note 25, p. 257; Hammargren, Henning see note 26, p. 206; Jarneberg, Eric, see note 30, p. 57.
34. Forslund, Mikael: *Katapultflygplanet S 9 Hawker Osprey och flygplankryssaren Gotland*, M. Forslund produktion, Falun 2000, p. 82 (quoting from a 1939 status report on the Air Force).
35. Op. cit., Hammargren, Henning, see note 26, p. 139.
36. Op. cit., Forslund, Mikael, see note 34, p. 56.
37. Op. cit., Jarneberg, Eric, see note 30, p. 47.
38. Frode Lingjerdet, personal communication 1/8 2014.
39. Op. cit., SOU 1926:34, see note 23.
40. Op. cit., Landquist, Axel Daniel; Tornberg, see note 29, p. 57.
41. Ibid., Landquist, Tornberg, p. 73.
42. Ibid., Landquist, Tornberg, p. 57.
43. Op. cit., SOU 1926:34, see note 23, p. 71.
44. Bratt, Karl Axel: *I krigarens lovliga avsikt*, Lars Hökerberg, Stockholm 1952, pp. 171-179.
45. Enell, Harald: "Årsberättelse i flygväsende 1929", *Tidskrift i Sjöväsendet* 1929, p. 329.
46. Ibid., Enell, p. 333 (italics in original).
47. Krook, B.: "Flygstridskrafternas användande av kemiska stridsmedel i marinens tjänst", *Tidskrift i Sjöväsendet* 1930, p. 722.
48. Örnberg, Arthur: "Herraväldet i luften", *Tidskrift i Sjöväsendet* 1929, p. 388.
49. von Krusenstierna, H.: "Flygvapnets ställning", *Tidskrift i Sjöväsendet* 1929, p. 379; de Champs, "Herraväldet i luften", *Tidskrift i Sjöväsendet* 1929, pp. 604-605.
50. Ibid., Krusenstierna, p. 383.
51. Op. cit., Giron, Marc, see note 32, p. 374.
52. Mason, Francis K.: *The British bomber since 1914*, Putnam Aeronautical Books, London 1994, p. 207.
53. *Betänkande med Förslag till ordnande av Sveriges försvarsväsende avgivet av 1930 års försvarskommission. Del IV. Flygvapnets organisation*, SOU 1935:41, K. L. Beckmans boktryckeri, Stockholm 1935, p. 10.
54. Op. cit., Hugemark, Bo, see note 16, p. 287.
55. Örnberg, Arthur: "Bomb- och torped anfall mot mål till sjöss", *Tidskrift i Sjöväsendet* 1932, p. 389.
56. Clason, Edw.: "Om störtbombfällning och försvar däremot", *Tidskrift i Sjöväsendet* 1935, p. 27.
57. Giron, August: "Dragkampen mellan försvarsgrenarna", *Tidskrift i Sjöväsendet* 1935, p. 221.
58. Op. cit., Clason, Edw., see note 56, p. 40.
59. Op. cit., SOU 1926:34, see note 23, p. 45.
60. Op. cit., Forslund, Mikael, see note 34, p. 96.
61. Op. cit., 1930 Defence Committee, FII, see note 21, vol. 11, document 23.
62. Hård, G.: "Kan den nya flygorganisationen antagas tillfredsställande trygga marinens behov av ett gott flygvapen?", *Tidskrift i Sjöväsendet* 1926, pp. 266-267; Örnberg, Arthur: "Några ord om luftnavigering över hav", *Tidskrift i Sjöväsendet* 1928, p. 25.
63. Op. cit., Hammargren, Henning, see note 26, p. 121.
64. Marc Giron's archive, vol. 1, "Krigsfartygs konstruktion och byggnad", p. 7.
65. Op. cit., Forslund, Mikael, see note 34, pp. 96-98.
66. Op. cit., SOU 1926:34, see note 23, p. 50.
67. Op. cit., Wulff, Petter, see note 11.
68. Kilmarx, Robert A.: *A History of Soviet Air Power*, Faber and Faber, London 1962 seems not to refer to dive bombing.
69. Coffey, Patrick: *American Arsenal. A Century of Waging War*, Oxford University Press, Oxford 2014, pp. 68, 72.
70. Layman, R. D. and McLaughlin, Stephen: *The Hybrid Warship: the Amalgamation of Big Guns and Aircraft*, Conway Maritime Press, London 1991, p. 42.