A Brief History of the FRA

From Morse to Cyber Defence

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What is signals intelligence?

Signals intelligence is the art of extracting information (intelligence) from electronic signals. Signals intelligence has existed since the mid 19th century with the advent of telegraphic communications, and from the beginning of the 20th century concerning radio.

The first step in signals intelligence is intercepting the interesting signals, usually in radio or cable transmissions. When the signal is collected, it often has to be processed to extract information, for example by translation, codebreaking or traffic analysis.

Traffic analysis is the art of deducing information via patterns in communication or geographic locations of transmitters. In this way important information can be gleaned even if the content of the transmission is not known.

Encryption is when the content of a message is hidden, either by replacing words by codes, or by enciphering, where each character is changed according to a mathematical formula.

Encryption was initially done manually with the aid of tables and codebooks. From the 1920s, electro-mechanical encryption machines were developed, the most well known of which is the German Enigma machine.

By painstaking analysis, it can be possible to extract the content of an intercepted encrypted message, which is called breaking a cyhper or code.

Signals intelligence can also be performed against signals not used for communication, for example radar signals. This is called ELINT. In Sweden, ELINT is performed by the signals intelligence agency, while in many other countries it is performed by the armed forces.

Before the FRA

Swedish signals intelligence collection started as early as the First World War. In the Swedish Navy, the telegraphists were encouraged to listen in on interesting transmissions from other nations when their time allowed. The main target of interest was the Russian Baltic fleet, and a number of surprisingly accurate reports were produced.

During the interwar period, the Navy's signals intelligence efforts continued against the by now Soviet Navy. In the thirties, courses were held in decryption for "suitable student conscripts".
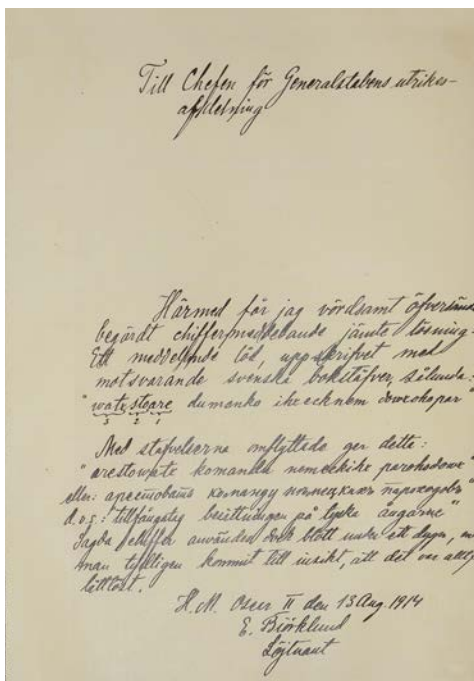
Report on the Russian Baltic Fleet from 1914.

In 1937, the Armed Forces were reorganized and the Armed Forces High Command was established. Within the High Command, a signal service department and a crypto department were formed. In 1938 a joint services collection station was established in Karlskrona, with the name of the High Command Radio Establishment. The High Command also organized a number of courses in decryption during the late thirties. This would give a good dividend during the forthcoming world war.

After the outbreak of World War II, operations expanded significantly. Due to

The joint services collection station in Karlskrona.

the lack of suitable facilities, the various parts of the service were spread out in different locations, mainly on Östermalm and Lidingö in the Stockholm area. The main targets of Swedish signals intelligence activities were the Soviet Union and Germany, which at this time were perceived as the biggest threats to Sweden.

The Geheimschreiber

On 9 April 1940, Germany invaded Denmark and Norway, and on the same day German authorities put in a request to Sweden to use the Swedish west coast cable for traffic to occupied Norway. After some hesitation on the Swedish part, the request was approved, but of course the possibility of intercepting the traffic was an important factor in the Swedish decision. On 19 May, the first teleprinter traffic was intercepted, initially in the clear but soon encrypted with something the Germans called "Geheimschreiber", which was colloquially translated as the "G-printer" by the Swedish intercept personnel. *

Geheimschreiber.

    The machine was actually called Siemens & Halske T52, but this was not known in Sweden at the time. In Britain this machine was known by the code name "Sturgeon".

The task of leading the decryption work for the new cypher went to Arne Beurling, one of the mathematicians who had earlier participated in the Navy's decryption courses. He had previously worked on Soviet Baltic Fleet cyphers. After a couple of weeks, he was able to present a solution to the German crypto machine. A month later, logical copies of the machine were completed, and it was possible to initiate a large-scale decipherment of German traffic. A number of decryption devices (called "apps") were manufactured under strict secrecy by LM Ericsson, the forerunner of today's Ericsson, according to specifications provided by the cryptanalysts.

    Geheimschreiber traffic at first comprised traffic to and from occupied Norway, but later traffic to the German forces in Finland and to the German Embassy in Stockholm was also intercepted. The decrypted material was to provide an extremely important source of information for Sweden during the war. It would have given ample warning of any German plans for an attack on Sweden, and also provided insight in the general progress of the war as seen from the German side. Among other things, there were a number of telegrams detailing the preparations for operation Barbarossa, the German invasion of the Soviet Union, which was thus known in Sweden a couple of weeks before it took place.

German message about preparations for operation Barbarossa within the 163d infantry division. Among other things Russian interpreters are requested. This division was transited from Norway via Sweden to Finland in order to take part in the attack on the Soviet Union.

The establishment of the FRA

The FRA was officially formed as an independent agency on 1 July 1942, with the name of the Defense High Command Radio Institute. The reason why the FRA was removed from the High Command was probably the extent to which activities had expanded after the success with the decryption of the Geheimschreiber. The organization had simply grown too big and complex to be encompassed within the Armed Forces High Command.

FRA personnel in the 1940:s.

At the time of the establishment, the FRA had 384 personnel, of whom 53 were officers seconded from the Armed Forces and 60 conscripts. The organization consisted of an administrative bureau, an intercept bureau, and an analysis bureau. This organization would continue virtually unchanged until the 1970s. Commodore Torgil Thorén became the first director of the FRA, with captain Åke Rossby as head of analysis, captain Olof Kempe as head of interception and Sten von Porat heading the administration. All four had a background in the Swedish Navy.

The Commander in Chief and the Armed Forces High Command were the main recipients of reports and had a great influence on targeting and the direction of efforts. However, the instructions said that the Foreign Minister and the Minister of Defence should be "kept informed about the focus and general progress of the work".

At the time, FRA's intelligence efforts covered eight main areas:
- The military capabilities and activities of Germany
- The military capabilities and activities of the Soviet Union
- Diplomatic traffic in general
- Support for the Swedish Security Service (for example to detect activities of foreign agents in Sweden)
- Support for the Swedish Weather Service (most weather reports were encrypted during the war and meteorological information could be difficult to obtain)
- Support for the Secret Military Intelligence Service (called the C-bureau)
- Cryptological advice to the Ministry of Foreign Affairs (to keep Swedish diplomatic ciphers secure)
- Signals security for the Swedish Armed Forces (to ensure that the Swedish military did not reveal information through its broadcasts)

Interception and decryption of diplomatic messages scored successes against many different countries, the most important ones being Germany, Great Britain, the United States and France. Codes and ciphers were also read to a greater or lesser extent from a number of other countries.

Facilities and relocation to Lovön

FRA headquarters on Lovön in 1943.

The premises used by FRA in the Stockholm area during the first half of World War II were hastily arranged, dispersed and not particularly suitable for the type of work performed. A new location had to be found where there would be room for the entire organization. Preferably it should be in a reasonably secluded location, yet close to Stockholm and with good conditions for radio reception. A site on Lovön, an island in Lake Mälaren, close to Stockholm, fulfilled these requirements, and was selected for the construction of FRA's new headquarters. Construction of the new site was finished in the fall of 1943.

During the war, a network of intercept stations was established in many locations around the country. This was to remain largely unchanged for many years after the war. In the north there was a station in Morjärv, with collection directed against the Soviet Northern Fleet. This station was later moved to Öjebyn outside Piteå. On the Baltic island of Gotland there were stations at Fårösund and in the vicinity of Ljugarn. Their efforts were aimed towards the Baltic area and Poland. As mentioned before there was a station in Karlskrona, which focused it's interception on the southern Baltic Sea. A detachment was located in Strömstad up to 1945, with a mission to observe the German forces in Norway. A station was also located in Malmö from 1942, with missions directed against the German air defence and the German Navy.
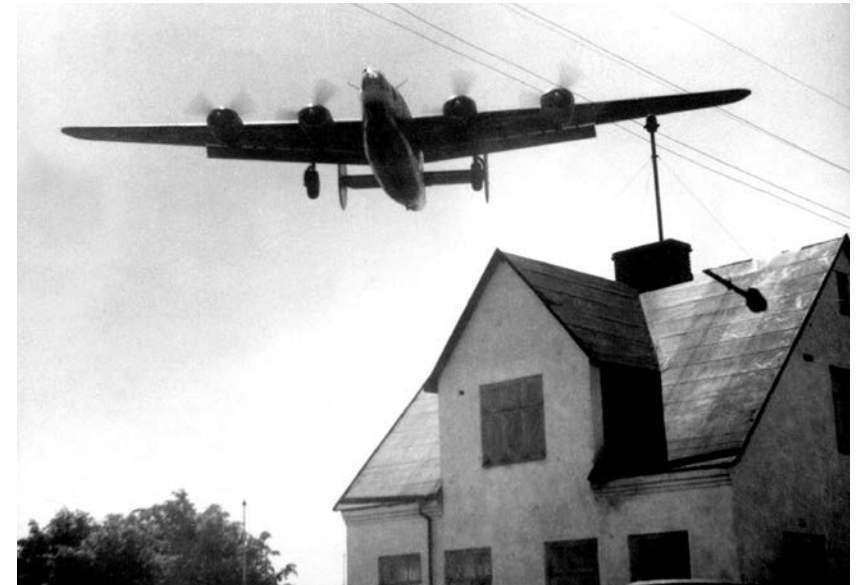
A US Liberator bomber making a forced landing in Sweden passes over the FRA intercept station in Malmö during WW II.

Cooperation with Finnish Signals Intelligence during World War II and Operation Stella Polaris

Cooperation between the Swedish and Finnish signals intelligence organizations had started during the Winter War, and carried on during the Continuation War. The exchange was mainly concerned with the Soviet Union, covering both raw intercepts, analysis and reporting. There was also cooperation on diplomatic traffic from several countries.

During the summer of 1944, preparations were made for a possible evacuation of the Finnish signals intelligence service to Sweden. At the time it seemed possible that Finland might be occupied by the Soviet Union. When Soviet forces occupied the Baltic States in 1939, intelligence personnel in these countries had been imprisoned or executed. It seemed likely that similar fates might befall Finnish intelligence personnel in the case of a Soviet occupation. Thus an evacuation plan was conceived with the code name "Stella Polaris".

In September 1944, after the Finnish-Soviet armistice, 750 persons connected to the Finnish intelligence service were evacuated to Sweden. Among them were also families of the employees. A considerable amount of equipment was also transferred. The Finnish radio equipment provided a much needed addition to FRA, which had been starved of modern equipment during the war. When it later turned out that there would be no Soviet occupation of Finland, most of the evacuees returned. However, about twenty people were employed by the FRA and stayed in Sweden.

Personnel from Finnish signals intelligence on their way to Sweden aboard S/s Osmo in 1944.

After the Second World War

Intercept station on the island of Gotland in 1950.

Immediately after World War II, there was a debate in Sweden about whether or not an intelligence service was needed, now that there was peace in Europe. In 1946 and 1947 FRA reported about massive electoral fraud in favor of the communists in the Polish referendum and elections. At the same time the iron curtain descended and it became apparent that there would be no democratic development in Eastern Europe. This led to the realization that there was a need for a Swedish intelligence service even in peacetime.

During the cold war FRA became an important alarm bell in the Swedish defense system. Sweden had a military defense based on conscription, and there was a need for timely warning of an impending attack, so that the Swedish armed forces could mobilize in time.

The main focus for the FRA during the Cold War was military activities and capabilities in the Baltic area. To a large extent, collection was directed against the Soviet Union and the other members of the Warsaw Pact. In addition to military matters, there was also a significant effort against non-military communications of various kinds in support of Swedish foreign and security policy.

The downing of the Swedish DC-3 signals intelligence aircraft

The DC-3 aircraft that was shot down, taken on Barkarby airfield outside Stockholm. In the background "Blondie" can be seen.

Airborne collection of signals can be advantageous when intercepting short-range signals, for example radar signals. If you can put the antenna higher up, in an aircraft, it is possible to receive signals that could not be received from the ground.

Swedish airborne interception started in the late 40's. At first an obsolete bomber of the type Junkers Ju 86, called "Blondie", was used. In 1949, the Air Force purchased two surplus DC-3 aircraft, which were modified for signals intelligence collection. The first collection flight with this aircraft type took place in June 1951, and after that one to two flights were performed per week.

In 1952, a dramatic event in the history of the FRA took place, when one of the Swedish signals intelligence collection aircraft was shot down. This was the beginning of what came to be known as the "Catalina affair", as a Swedish reconnaissance plane of the type Catalina which was looking for the lost plane was shot down by Soviet aircraft the following day.

The Swedish DC-3 * was on a routine collection flight when it disappeared. On board were eight men, five from the FRA and three from the Swedish Air Force. Already at the time there was reason to suspect that the Swedish aircraft had been shot down by the Soviet Union.

The event occurred during a very cool period of the Cold War, and it was not unusual that military reconnaissance aircraft, and even in some cases civilian air-liners, were shot down in different areas of the world by suspicious countries. The spirit of the times was such that it was not openly admitted that signals intelligence was performed by Sweden. Consequently, a lot about the DC-3 was kept secret, which led to a by today's standards poor treatment of the relatives of the disappeared aircrew.

Long after the event, in 1991, the Soviet Union admitted to shooting down the aircraft. The wreck of the aircraft was found in 2003 and was salvaged the following year. It is now exhibited at the Swedish Air Force Museum in Linköping.

The aircraft was actually rebuilt to a C-47, the military version of DC-3.
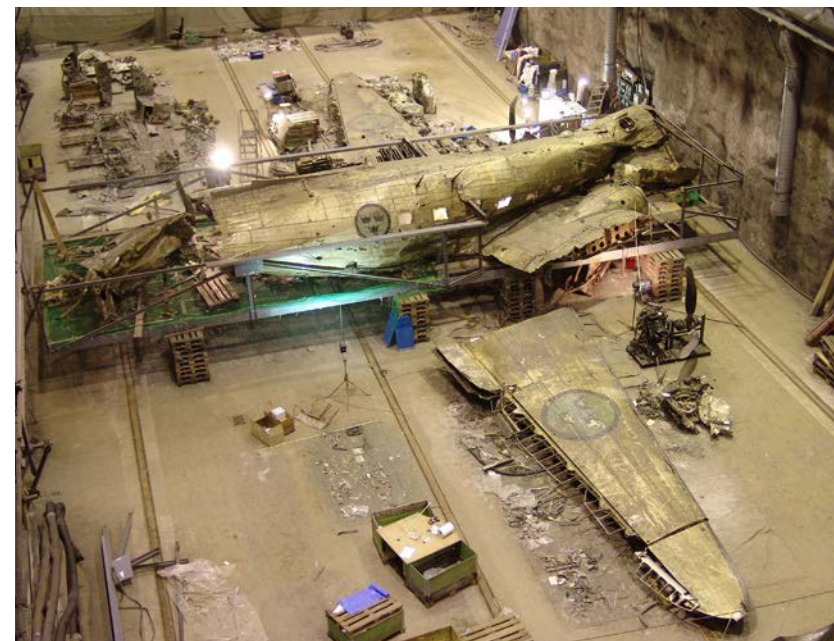
The salvaged wreck of the DC-3 is investigated at Muskö naval base near Stockholm.

Developments and reporting during the Cold War

The Cold War characterized FRA's work for many years. When the technological development leading to today's computers gained momentum in the 1950s, FRA was in the forefront of work in Sweden regarding "automatic computing". In 1953, FRA for the first time gained access to computer power through the computer BESK, which increased decryption capabilities.
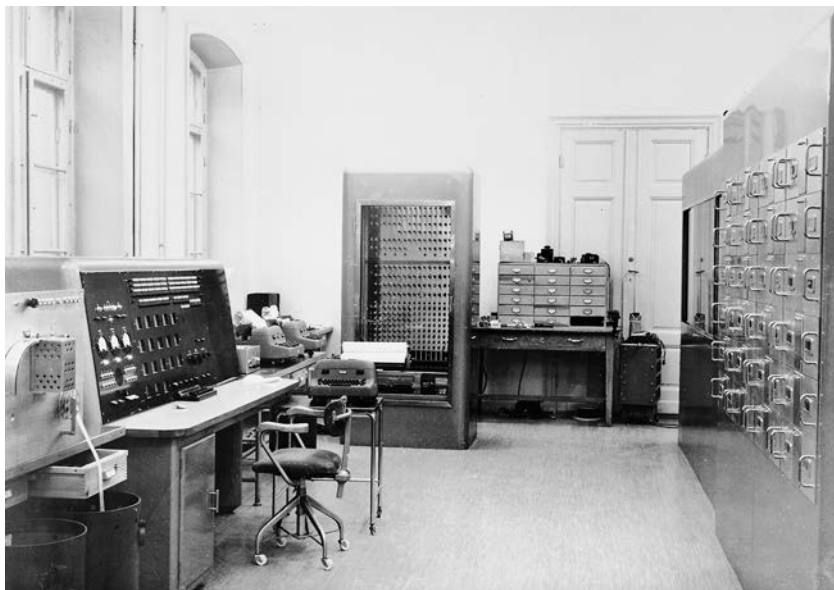
In 1953, FRA for the first time gained access to computer power through the computer BESK, which increased the decryption capabilities of the agency.
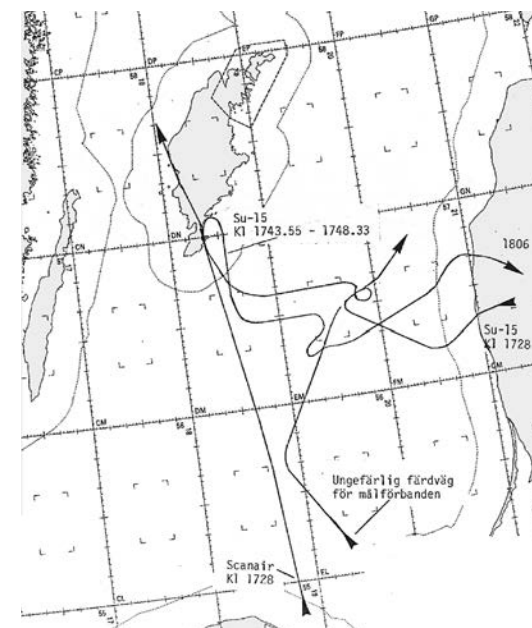
In 1956, FRA reported to the Swedish government about the dramatic events in Hungary when Soviet tanks ended the insurgency against the communist regime.

In the period leading up to the Warsaw Pact intervention in Czechoslovakia in 1968 and the crushing of the democratization efforts known as the Prague spring, FRA reported about troop concentrations around Czechoslovakia and that a military invasion could be imminent.

During the 1970s, communications satellites became an important part of international telecommunications. FRA developed the ability to collect satellite signals, which provided a good basis for non-military reporting.

During the latter part of the Cold War a number of incidents and dramatic events took place in the air over the Baltic Sea where Swedish and Soviet aircraft were involved. On the Swedish side, there was a worry that Sweden was the subject of intentional provocations from the Soviet Union.

Map of the so called Scanair incident in 1984, when a Soviet fighter followed a Swedish airliner over the Swedish island Gotland.

FRA cooperated intimately with the Swedish Air Force concerning the various incidents and in many cases the FRA could provide a more complete and balanced assessment of the course of events. In several cases, the FRA could show that the incidents were due to mistakes or adventurous behaviour by individual Soviet pilots, and not due to intentional provocations.

The end of the Cold War and a globalized world

Swedish troops in Afghanistan.

In the 1980s, demand increased for more analysis from the FRA concerning the collected material. Previously, the FRA had not done much analysis beyond decryption and translation. This resulted in an increased employment of intelligence analysts with an education in political science and foreign languages. The end result was more refined and qualitatively superior reporting from the FRA.

In connection with the fall of the Berlin wall in 1989, FRA reported on the changes in Eastern Europe and the conflicts that occurred during the dissolution of the Soviet Union. Among other things, FRA could report about unrest in the Caucasus and the dramatic events of the Soviet Army attack on the television tower in Vilnius in 1991.

After the fall of the Soviet Union and the end of the Cold War, the tasks of the FRA were broadened. The Swedish Armed Forces took part in an increasing number of international missions, including Bosnia, Kosovo, Chad, Somalia,

Libya and Afghanistan. This led to a need for FRA to provide support to the Armed Forces in completely new areas. These were often areas that required completely new language skills. It turned out to be an asset that there are large groups of immigrants in Sweden with useful language skills, and in a longer perspective, this led to the FRA's staff becoming increasingly multicultural.

In connection with the Iraq war in 2003, the possible Iraqi ownership of weapons of mass destruction became a major issue. The most important casus belli for the US-led coalition was the Iraqi development of weapons of mass destruction, and it was alleged that Iraq supported the Al Qaeda terrorist organization. The FRA reported that there was no evidence that Iraq was close to developing nuclear weapons, nor could FRA see any Iraqi support for al Qaeda. This provided an important basis for the Swedish government's positions during the conflict.

In the meantime after 2000, new areas have been added to FRA. The threat of terrorism has once again become an important concern. Threats to our information systems was added as a new field in the 21st century.

The FRA debate

For many years FRA based its activities on the principle that "the ether is free", that is, anyone can listen to radio signals. Wartime intercepts of German cable communications was based on wartime emergency laws. Radio traffic, which also includes satellite transmissions, provided a good basis for FRA reporting.

However, technical developments in the early 2000s led to a majority of international communications moving to fibre optic cables. This had the effect that the basis for much of FRA reporting was slowly disappearing. It was clear that there was a need to change the legislation so that intercept of other information than radio transmissions became permissible.

There was also a need to clarify the legislation underlying the activities of the FRA from a standpoint of privacy. In the 1940s, interception of government and military communications created few risks to personal data in general. However, with the increasing use of the internet, all kinds of communications were mixed. Foreign military organizations, terrorists and ordinary people all use the internet, which made personal data protection issues much more pertinent.

This led to a proposal for changes in Swedish legislation. A new law regulating the use of personal data in FRA intelligence activities was proposed. There was also a new law on the use of signals intelligence in foreign intelligence, and changes to the laws on foreign intelligence and on the law on electronic communications. All in all the changes were aimed to clarify the earlier rather sketchy Swedish legislation on signals intelligence activities.

When these proposals for new legislation were made public, they were misinterpreted in some quarters as massive new government surveillance powers, and that the FRA would monitor the internet traffic of all Swedes. This led to a heated public debate, at times characterized by wild exaggerations. After some delays and discussions, the Swedish parliament in 2008 decided on a somewhat modified version of the legislation, where the provisions for protection of personal data had been strengthened. Despite the misunderstandings and the intense debate, Sweden got one of the most comprehensive and modern legislations for signals intelligence in the world.


Headlines from the time of the FRA-debate.

FRA and Swedish information security

Already when FRA was first formed, the agency had tasks concerning Swedish information security. FRA had a mission to ascertain the security of Swedish military and diplomatic crypto systems, and to take part in the construction of such systems.

After the Swedish entry into the European Union in 1995, Swedish participation in international cooperation around cryptographic issues increased. FRA had a strong reputation in the crypto area, which led to FRA taking part in the creation of common secure systems for EU cooperation.
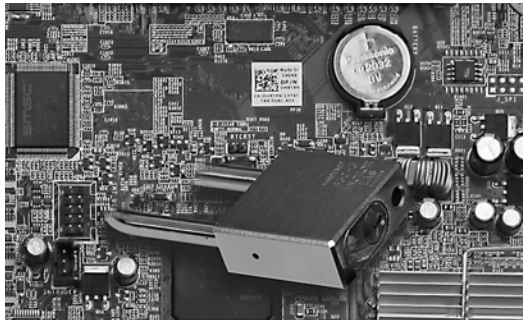
At the end of the 1990s, FRA created a department to check the security and integrity of its own computer systems. Their task was to "hack" the agency's own systems to find security flaws. The results were so useful that the activities were expanded to supporting the information security of other government agencies on their demand.

After a government survey in 2001 on vulnerabilities in government systems, the role of the FRA as an agency with special tasks in the information security area was more clearly defined. The tasks that were mentioned were analysis of vulnerabilities, penetration testing, education, giving advice to other agencies and to provide support in the case of a major crisis involving IT-systems.

Todays increased threats to our information systems and the dependency of our modern society on these systems, have led to information security and cyber defense being some of the most prioritized activities within the FRA. The knowledge in the FRA about information security coupled with signals intelligence about foreign attackers and their methods give the FRA unique insights about the cyber threat.

FRA today

The FRA works with the latest technology which requires technicians and engineers, but we also employ analysts with knowledge of foreign languages, current events and military matters.

FRA has continued to evolve and follow the pace of technical development to have the capabilities demanded of a modern intelligence service. Reliable information about the world around us is an important prerequisite for an independent Swedish foreign and security policy. Sweden must also protect itself against foreign powers stealing valuable Swedish information. FRA continues to have an important role in both these missions.

By reporting about foreign intelligence targets and strengthening Swedish information security, FRA contributes to Swedish security and to Sweden's international standing.

The FRA can for example report about:
• Military capabilities of other nations
• Developments in wars or crisis areas
• International terrorism
• Government sponsored IT-attacks

The agencies that can task the FRA are the Government, the Swedish Armed Forces, the Swedish Security Services and the Swedish Police. In all cases, FRA signals intelligence must always be directed against foreign phenomena.

Apart from signals intelligence, FRA also contributes to the security of Sweden by helping to strengthen the protection of Swedish vital infrastructure. Our leading edge competence in the field of IT security is among other things used to supporting Swedish government agencies with securing their IT systems. In these efforts, our unique insights into global cyber threats provided by our signals intelligence capabilities play a vital part.
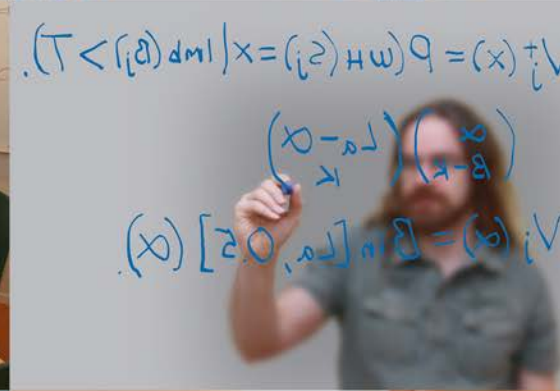
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