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NRA SECURITY

Swedish industry proposal for a National Research Agenda for security

IFMETALL

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by funding *needs-driven research*
and developing *effective innovation systems*.

Through its activities in this field, VINNOVA aims to make a significant contribution to Sweden´s development into a leading centre of economic growth.

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NRA Security

Swedish industry proposal for a National Research Agenda for securityy

June 2008

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1 Executive summary

The proposal for a national research agenda (NRA Security) is aiming at giving important input for government decisions concerning future R&D directions in the field of civil security. The NRA is created by a group of industry, research and civil service representatives with strong interest in global civil security markets, products and research.[1]

The civil security market is steadily growing

The threat of large-scale military aggression has subsided and is substituted by other complex, trans-national threats. Terrorist threats, infrastructure, climate change, and personal integrity, all represents security topics, each of vast proportions. The total market for "Civil Security" was 210 B SEK in 2007 and will grow to 320 B SEK in 2012. The budget of The FP 7: Security is €1 billion per year.

Swedish capabilities are world class, but may fade

Sweden has a long record in security-oriented technologies and has grown industry and technology of world class both when military applications and civil use in the modern society are concerned. Here and now we can establish the technological strength, but the market potential does not redeem by itself. The capability may be substantially weakened in a short period of time if the R&D investments do not gear up. The experience from the National Security programme (50 MSEK[2]) is positive and there is a need for finding further synergies and docking separate initiatives.

Timely action for keeping the lead

The strong sense of emergency has subsided with the distance to 9/11 and the market has matured. Hence, the needs and demands do no longer concern civil security alone but also efficiency. This calls for new and complex systems and long-term solutions where ICT[3] is the main generic technology. Sweden is a prominent IT nation with a broad structure, combining key industrial capabilities and research excellence. Swedish industry has also been in the frontline regarding integration capabilities and products. Civil security is a challenging pilot industrial area where Sweden has the opportunity to develop and further strengthen a competitive industry that will face strong future growth. The positive Swedish turn out in FP7

[1] Teknikföretagen, ABB, Ericsson, Saab Group, SICT, FOI, SEMA and IF Metall. VINNOVA has assisted the work.
[2] Of which 25% is industry's input.
[3] Information & Communication Technology

Security, the agreement with the Department of Homeland Security, and Sweden's EU Council Presidency in 2009 may all be used for strategic and proactive initiatives. The time to act is now.

The need for R&D – scope, structure and priorities

The NRA group has chosen the approach in the Commission's ESRAB report when relating Swedish capabilities to the worldwide security market. The NRA group has judged the following technical domains being top key technologies to Swedish industry performance in the civil security market. Within each domain certain technical areas have been given priority.

1 Communication
2 Signal & Information technologies
3 Artificial intelligence and decision support
4 Information security technologies
5 Computing technologies

Actions and recommendations

- Actions to support innovative purchasing of R&D in collaboration with industry are recommended.
- RTD programmes should be designed for both mid-term and long-term horizons e.g. a framework programme until 2015 with a planning cycle of 3 years beginning in 2009.
- VINNOVA in collaboration with SEMA[4] should be the public part in a public-private initiative to design a complete strategy for security research well adjusted to the FP7 programme.
- Public contribution in a public-private investment plan should amount to about 30M€[5]. Industry should match this amount resulting in a long-term programme of 60M€.

[4] SEMA will be replaced by a new public authority MSB, Myndigheten för Samhällsskydd och Beredskap on the 1st of January 2009.
[5] SEMA has recommended a R&D budget for the new organisation of 200 MSEK per year. The above mentioned amount of 30M€ (not more than 40 MSEK per year in a 7-year programme) should be earmarked for export oriented service- and product developments and not included in the 200 MSEK.

2 Sammanfattning
Ett nytt industriellt område: Säkerhet

Varför riktade FoU-insatser kan ge Sverige ett försprång

Marknadsbehov

Marknaden för säkerhetsprodukter och- tjänster är växande. Det har varit så alltsedan terrorkatastroferna i New York, Madrid och London. Det finns fog att säga att dessa händelser skapade en mer eller mindre okontrollerad våg av åtgärder som nu övergått i en mer mogen och eftertänkt fas.

Det ska samtidigt nämnas att naturkatastrofer, typ tsunamin i Asien 2004 med speciella förtecken för Sverige och förmodade klimatändringar på senare år har gett en stark global opinion för säkerhetsbefrämjande åtgärder.

Utvecklingen inom IT är en av de viktigaste förutsättningarna för att den sk kritiska infrastrukturen i samhället ska fungera och säkerställa vårt växande beroende av datakommunikation som tex Internet. Styrning av el, vatten och värme till samhälle och industrier blir alltmer beroende av datakommunikation.

Marknaden domineras huvudsakligen av privata företag främst inom områdena energi, telekom, transport, bank-, försäkring och byggindustri men också av offentliga affärsdrivande företag som ansvarar för hamnar, flygfält, bussterminaler, skolor mm. Kravställare i form av myndigheter är en viktig pådrivare för nödvändiga åtgärder som leder till affärsbeslut. Detta sker i hela den industrialiserade världen.

Den totala marknaden för ”Civil Security” är nyligen beräknad till SEK 210 miljarder för år 2007. År 2012 beräknas den uppgå till SEK 320 miljarder[6].

Resurser och förmågor

En världsledare i säkerhet framförallt inom bevakning och värdehantering är Securitas-koncernen, med 215 000 medarbetare i mer än 30 länder och en försäljning på SEK 63 miljarder[7]. En fantastisk svensk företagsutveckling helt inriktad mot säkerhet.

[6] Bain analysis via Saab 2007-11-12
[7] Årsredovisning 2007 från www.securitas.com

Andra stora företag som visar växande intresse för säkerhet är Saab, ABB och Ericsson inte att förglömma transportområdet med Volvo, Scania och Hägglunds. Dessa företag har ingen kärnmarknad i säkerhet men deras produktion kräver kunskap och kompetens som i hög grad liknar den kunskap och kompetens som säkerhetsprodukter och –tjänster kräver. Dessutom levererar de redan säkerhetssystem för infrastruktur typ kärnkraftsanläggningar mm. Ett exempel på utvecklingen inom området är Security Arena inom Lindholmen Science Park, en trippel-helixlösning med industrin, myndigheter och akademier i samarbete.

All säkerhetsteknik är vidare beroende av IT och elektronik. Hur ser den företagsmässiga resursen ut i Sverige? Enligt ett VINNOVA-PM[8] finns 830 företag med 67000 anställda sysselsatta i den sk IKT-sektorn[9]. I företag med ***internationell konkurrenskraftig FoU-verksamhet*** det vill säga FoU i framkant uppgår sysselsättningen till mer än 28000 personer fördelade på 172 företagsenheter.

I en global verklighet finns underleverantörer över hela världen, men Sverige med sin historia att bygga egna försvarssystem (flygplan, ubåtar, stridsfordon) har inhemska möjligheter att konstruera och producera säkerhetssystem. Små och medelstora företag (SME) med specialkompetenser spelar en viktig roll tex inom försvarets materiel- och systemförsörjning. Det rör sig om kvalificerat oberoende analys-, utrednings-, utvärderings-, anskaffnings-, och upphandlingsstöd.

Några har bildat en grupp, SME-D[10] som består av ett 20-tal företag med en årsomsättning på ca SEK 4 miljarder varav 500 miljoner mot försvaret. 80% av de anställda är akademiker. I gruppen finns framträdande expertis inom systemanalys, utformning av komplexa system, ledningssystem, modellering och simulering, infrastrukturplattformar, IT-säkerhet etc.

Allt detta kan utnyttjas inom säkerhetsområdet speciellt om man hittar lämpliga systemtillverkare som tex ovan nämnda mer resursstarka svenska företag som kan agera mellankunder för utveckling och leveranser till myndigheter och andra slutkunder över hela världen[11].

[8] Promemoria om den hårdvarunära IKT-sektorn i Sverige 2007-04-13, Patrik Sandgren, VINNOVA
[9] Informations- och KommunikationsTeknologi
[10] Small and Mediumsized Enterprises - Defence
[11] Ett exempel är ABBs Västerås-utvecklade system för övervakning av processer och anläggningar genom världsledande design av kontrollrum (System 800xA)

Forskargrupper på universitet och högskolor, VINN Excellence Centers inom IKT-sfären och FOIs gedigna kompetens inom CBRNE[12]-områdena ger Sverige klara fördelar.

Sammantaget finns resurser i Sverige både vad gäller stora företag och mindre som i rätt slags samspel med kunder och forskningscentra kan generera innovativa lösningar för en global säkerhetsmarknad.

En ytterligare svensk resurs finns i den svenska erfarenheten av public-private procurement som många gånger är en förutsättning för att tillfredsställa en efterfrågad utveckling av systemövergripande tjänster och nya kommersialiserbara produkter inom säkerhetsområdet.

Uppväxling och timing

EUs ramprogram, FP7 med sina särskilda säkerhets- och kombinerade IKT och säkerhets-utlysningar växlar upp forskningen inom området. Kontaktytor i Europa skapas för både företag och forskare som kan innebära framtida metod- och produktutveckling med säte i Sverige.

FP7 har nyligen startats upp. Redan nu kan vi se efter två ansökningsomgångar inom tema Säkerhet att Sverige kan nå fina framgångar om följande förutsättningar uppfylls:

- Nationell fokusering på FoU med satsningar på prioriterade förmågor inom säkerhetsområdet (capabilities) enligt ESRAB-rapporten, jmf pågående VINNOVA-KBM-utlysningar.
- Uppbackning av godkända EU-projekt via nationella FoU-program.

Det är nu som vi med svenska satsningar kan backa upp denna säkerhetsforskning som bara blir verklighet med egna nationella insatser. Det är en förutsättning för att få delta på gemensam grund med övriga medlemsstater i unionen.

Det nationella programmet för säkerhetsforskning[13], ett samarbete mellan KBM, FMV och VINNOVA har gett bra erfarenheter och kan användas som en pilot för ytterligare satsningar. Likaså har goda erfarenheter erhållits av KBMs utlysning för stöd att utforma EU-ansökningar som genomfördes under våren 2007.

Den svensk-amerikanska överenskommelsen inom säkerhetsområdet[14] skapar de bästa förutsättningar för samarbeten över Atlanten men samtidigt

[12] Chemical, Biological, Radioactive, Nuclear, Explosive
[13] FÖ2006/2104/CIV, 50MSEK utlyst under 2006 och 2007 vilket gav 18 förstudier och 5 beviljade projekt.
[14] MoU, Memorandum of Understanding mellan sv. Regeringen och DHS, Dept of Homeland Security från 2007.

måste man vara klar över att det är mycket resurskrävande att initialt få igång dessa projekt.

En svensk NRA inom säkerhetsforskningen som är frukten av ett samarbete mellan företrädare för verk, myndigheter och företag är ett annat sätt att främja nationella satsningar som ger förutsättning för kommande export inom ett nytt industriellt område.

EU:s årliga konferens för säkerhetsforskning förläggs till Sverige hösten 2009 under Sveriges ordförandeperiod. Säkerhetsforskningen kommer i ett europeiskt fokus och värdlandets FoU-satsningar kommer att bli uppmärksammade och jämföras med andra medlemsstaters åtgärder inom området.

Fokusering / strukturering

En undersökning initierad av den svenska NRA-gruppen har gjorts beträffande forsknings- och kompetensläge på säkerhetsområdet i Sverige och den har relaterats till den globala marknaden. Följande prioriterade forskningsområden där statliga insatser med inriktning mot säkerhetsområdet kommer att gynna utveckling av nya tjänster och produkter visade sig vara:

Kommunikation med prioriterade delområden:
Säkra och rekonfigurerbara mobila kommunikationer, nätverkshantering, reglerutrustning och övervakning av kommunikationsnätverk, protokolloberoende kommunikationer, säkra trådlösa förbindelser, bredbandsöverföring och kommunikationer i svåra miljöer.

Signal- och informationsteknologi med prioriterade delområden:
Integrering av dataströmmar, sensorer, datainsamlig och –klassificering, bildbehandling och data- och IT-hantering.

Artificiell intelligens och beslutsstöd med prioriterade delområden:
Databashantering, IKBS/AI[15]-tekniker, modellering, simulering och optimering av beslutsstödssystem.

Informationssäkerhet med prioriterade delområden:
Kryptering och datanyckelhantering, databasteknik, reglering av access, filterteknik, autenticeringsteknik, kryptografi.

Data- och datorteknologi med prioriterade delområden:
Protokollteknik, mjukvaruarkitektur, felsäkra datasystem, högpresterande datasystem och programbehandling[16].

[15] Information Knowledge Based Systems / Artificiel Intelligens

Säkerhetsinriktad forskning med ovanstående innehåll bedöms kunna gynna svensk tillväxt genom utveckling av produkter och tjänster i ett nytt innovationsområde.

Förslag[17]

1 Skapa förutsättningar för innovationsupphandling av FoU i samarbete med industrin.

2 FoU-program skapas och genomförs på både kort och lång sikt tex via ett ramprogram tom 2015 med en planeringscykel om 3 år med början 2009.

3 VINNOVA tillsammans med den nya Myndigheten för Samhällsskydd och Beredskap , MSB, blir den statliga medspelaren till industrin för att initiera strategier för säkerhetsforskning som ligger rätt i förhållande till EUs satsningar inom säkerhetsområdet.

4 En statlig insats i en offentlig-privat investering bör uppgå till ca 300 MSEK och den privata lika stor innebärande ett totalt program på ca 600 MSEK under en 7-årig period med början 2009.[18]

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[16] Software engineering

[17] ”International studies show that governmental investments in R&D create an increase in industrial turnover with a factor between 3 times (mature markets) and 20 times (developing markets). A fair part, about 40%, of this increased industrial turnover is funneled back to the government through direct and indirect taxes, thus ensuring a sound return of investment.” enligt Håkan Gergils.
En studie av resultaten från de senaste årens verksamhet vid forskningsinstitutet Acreo (IKT-orienterat) pekar på en industriell multipel om 10 gånger enligt Mårten Armgarth, baserat på rapport till VINNOVA.

[18] Denna exportinriktade och tillväxtorienterade satsning bör åtskiljas från KBMs nuvarande förslag om 200 MSEK per år för säkerhetsforskning via den nya krisberedskapsmyndigheten.

3 The market

The threat of large-scale military aggression has subsided and is substituted by new threats that are multifaceted, interrelated, complex and increasingly trans-national in their impact. The current focus on security against terrorist threats is only one of the challenges. Infrastructure, pandemics, climate change, and personal integrity, represents other security topics, each of vast proportions, which have to be dealt with through research and technological development. These new threats were laid out in the European security strategy[19] Implementing this strategy requires internal and external security instruments covering intelligence, police and judicial, economic, financial, diplomatic and technological means.

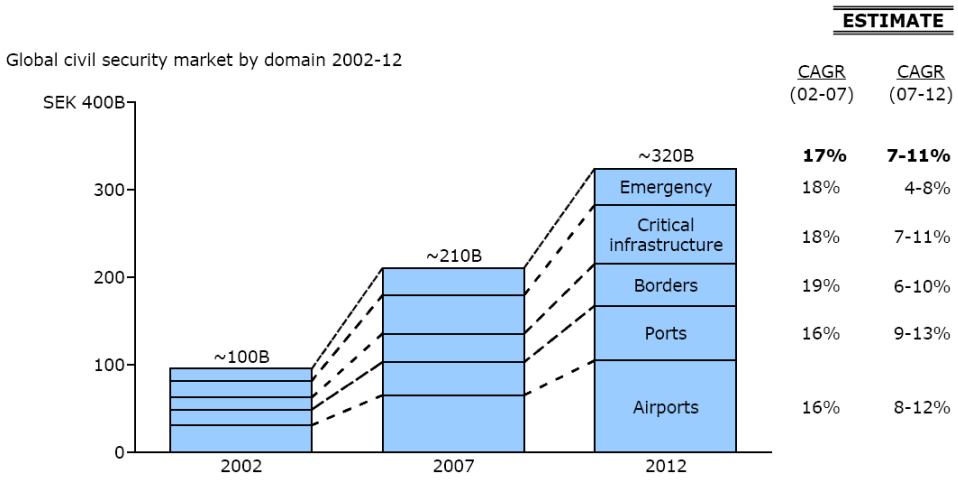
The risks in society are continuously changing and so the systems and ways to manage these risks have to develop and be renewed. The basis for dynamic reactions to new risks is a capability of rapid build up of new knowledge through global intelligence activities, relevant research and risk- and vulnerability analyses. Government investigatory work in Sweden has covered the risks caused by climatic change[20] that can be considerable. One example is the risk of Swedish lakes being flooded with reportedly serious consequences to people, property and infrastructure. Another work by an independent commission covered the Swedish perspectives of the natural disaster in Asia of December 2004[21].

The market is dominated by commercial actors – mainly private companies within the energy, telecom, transportation sectors etc, but also publicly owned as harbours and airports – while agencies and authorities drive the demands.

The market needs and demands are steadily growing. The total market for "Civil Security" was 210 B SEK in 2007. In 2012 this market will grow to 320 B SEK (according to Bain Analysis). As an illustration of the importance the budget of the Framework Programme 7: Security is €1 billion per year. It looks like Sweden will get a successful turn out, but industry's participation need to be strengthened.

[19] "A secure Europe in a better world" (December 2003)
[20] "Sverige inför klimatförändringar – hot och möjligheter", SOU 2007:60
[21] "Sverige och tsunamin – granskning och förslag", SOU 2005:104

Civil security growing in all domains; Ports and airports expected to grow fastest



Source: Bain analysis

4 Swedish resources and capabilities

Sweden has a long record in security-oriented technologies. This holds for both military applications and a variety of civil use in the modern society. During the after-war period Sweden has grown both industry and technology of world class in many of these areas.

The industry

The Swedish IT-industry already addressing the security market covers more than 300 companies with more than 20.000 employees. As a whole the sector covers 830 companies with 67.000 employees. Some of the companies are globally well-known and big employers but most of them are high-tech and knowledge intensive SMEs with a great potential to grow on the extensive security market.[22] Moreover, since ICT and all it's derivatives is the main generic technology in security markets and R&D programmes all over the world, the security domain is of great importance for the Swedish industry, both for companies already addressing the area and companies who may benefit if the IT-based security profile and potential is made more visible.

Big companies showing a growing interest in security are Saab, ABB and Ericsson. Security is not their core business but the production knowledge and competence is very much similar to what is needed to develop security related products and services. They also deliver security systems for infrastructure e.g. to nuclear plants.

Companies on the customer side are dealing with emergency and security, surveillance and logistics. An example is Securitas with 215.000 employees in more than 30 countries selling for 63 B SEK[23]. Not to mention the vehicle industry with Volvo, Scania and Hägglunds.

Furthermore, since many of the companies are suppliers to public authorities, the focus is put on the potential in innovative procurement as a strategic measure to further strengthen the Swedish industry position.

The R&D position

Sweden has highly developed research environments in the area of security research and a long-standing tradition of creating complex systems

[22] VINNOVA Policy VP 2005:01
[23] Annual report 2007, www.securitas.com

solutions. There is also valuable expertise, of importance for security research, in the Swedish defence system

The system approach is facilitated by a well-developed infrastructure of *electricity, telecom and IT*. This sector invested 3B€ in research during the year 2005, which is equivalent to around 36% of the whole of Swedish business financed R&D[24].

Apart from the ICT sector, the research infrastructure is also strong in other areas of high relevance for a strategic Swedish position in the civil security research. Examples are the field of *Chemical, Biological, Radiological, Nuclear and Explosives threats* (CBRNE) with FOI, the CBRNE Excellence Center in Umeå and the Forensic Analytical Science Centre as some of the key players. The European Union has chosen Sweden as the site for the new European authority for infectious disease control.

Another area is *transportation***.** Traffic safety, with evident spill over to security systems, has emerged as a Swedish speciality and it is an important factor for making Swedish road vehicle industry competitive. Road telematics for example may support networked detection/warning/reporting systems. Safety R&D in the maritime transportation area are also interweaved, incited by the fatal foundering of the MV Estonia but beneficial also for preventing antagonistic threats on ships.

International cooperation

The Seventh Framework Programme for Research and Technological Development (FP7) is the EU's main instrument for funding research in Europe during 2007-2013. The programme contains a specific Security theme (Theme 10). The first call in FP7 – Security is soon completed with hopefully a fair outcome for Sweden. A couple of Swedish research institutions (primarily FOI) and a few companies are invited for negotiations by the Commission. A second call for proposals is expected to be launched this summer.

EUREKA[25] supports the competitiveness of European companies through international collaboration between SMEs, research institutes and universities, creating links and networks of innovation. A newly launched initiative, where Sweden is participating, is the joint EUREKA–EU Eurostars Programme, funding R&D driven SMEs up to 400 M€. Another on-going security relevant collaborative EUREKA programme is

[24] Needs-driven R&D programmes in sectorial innovation systems, VINNOVA Analysis VA 2007:15
[25] http://www.eureka.be/home.do

EURIPIDES[26], promoting integrated smart systems based on micro-systems and packaging and interconnection. The total public-private investment is almost 500 M€.

The European security research has been promoted and formed through annual security research conferences hosted by the EU presidencies. The first conference was held in Vienna in 2006[27], the second in Berlin 2007[28]. The third is planned for September 2008 in Paris and the fourth is part of the Swedish presidency in 2009.

[26] http://www.euripides-eureka.eu
[27] http://ec.europa.eu/enterprise/security/events/vienna_2006_report.htm
[28] http://www.src07.de/

5 The need for action

Timing

The security issue for society has grown over time because of the introduction of more and more complex systems that run our everyday lives. The capabilities to keep abreast of this evolution will decide our future well being. The strong sense of emergency has subsided with the distance to 9/11 and the market has matured. Hence, the needs and demands do not focus civil security alone but also efficiency.

Research and technology can play a supporting role as a force enabler in the complex and sensitive area of security. Without it there can be no progress towards either the social aspirations for a more free, secure and open Europe or the benefits of a more competitive technology supply chain. All of these hopes for the future depend on new solutions being developed and implemented and they all depend upon Europe having the technological capability.

This is why the EU as well as many member states tries to define the need for research, both basic and problem-oriented, in order to strengthen their capabilities to withstand the new challenges. The demands call for new and complex systems and long-term solutions where ICT is the main generic technology.

Sweden is a prominent IT nation with a broad structure, combining key industrial capabilities and research excellence. Civil security is a challenging pilot industrial area where Sweden has the opportunity to develop and further strengthen a competitive industry that will face strong future growth. Here and now we can establish the technological strength, but the market potential does not redeem by itself. The capability may be substantially weakened in a short period of time if the R&D investments do not gear up.

The experience from the National Security programme (50 MSEK) is positive and there is a need for finding further synergies and docking separate initiatives. The positive Swedish turn out in FP7 Security, the agreement with the Department of Homeland Security, and Sweden’s EU Council Presidency in 2009 may all be used for strategic action and positive impact in the next 10 years.

Initiatives taken so far

A proposal for a Swedish national strategy for security research is outlined in the VINNOVA policy report ”Knowledge to Safeguard Security” where vision and goals for a national strategy up until 2010 is presented. The proposal is the result of an assignment from the Swedish Government of April 15, 2004. It was implemented by a Working Group consisting of representatives from VINNOVA (Chair), the Swedish Emergency Management Agency (SEMA), the Swedish Armed Forces, the Swedish Defence Materiel Administration (FMV), the Swedish Defence Research Agency (FOI) and assisted by the Swedish National Defence College (FHS) and the Confederation of Swedish Enterprises (Svenskt Näringsliv).

This work was made somewhat prior to the publication in 2006 of the European Security Research Agenda (ESRA) created and implemented by the European Security Research Advisory Board (ESRAB). The ESRAB report[29] is supported by a member group of 50 experts from 23 countries including Sweden. More than 300 people and their efforts during a 16 months period are mirrored in this report[30].

The Swedish NRA reference group for security has concluded that the ESRAB report should serve as a model for a Swedish NRA in order to facilitate future comparisons of security research on a European level. This is outlined more in specific in the next section.

The NRA purpose

The NRA Security is aiming at giving important input for government decisions concerning future research directions. An NRA for security is also aiming at guiding and strengthening researchers, enterprises and public authorities in orienting their R&D in support of civil security work. The NRA clarifies the effective match between market needs, industry capabilities and the need for R&D in order to focus national initiatives for Swedish industry competitiveness on global markets. Such initiatives will also strengthen the ability to take maximum advantage of joint European financing in the field of civil security. It should be updated regularly in concurrence with new European initiatives e.g. via ESRIF.

[29] Meeting the challenge: the European Security Research Agenda, A report from the European Security Advisory Board (September 2006)

[30] A continuation of this work is the European Security Research Initiative Forum, ESRIF, in which both industry and agencies (SEMA,VINNOVA, FOI etc) contribute by recommending scope and context for coming work programmes in FP7.

6 R&D needs – scope, structure and priorities

Scope

Security research has two main purposes, a societal and an industrial:

- To contribute to the safety of citizens.
- To strengthen innovation, competitiveness and growth[31].

The ESRAB report says:

- Meeting **society's needs** through clearly defined customer (end-user) needs.
- Raising the **global competitiveness** of the European technology supply chain.

Hence, a wide spectrum of disciplines has to be considered when defining civil security research. To achieve the development of secure products and systems in society we need to be aware of the consequences of the processes of manufacturing as well as running systems of various purposes. This is asking for an attitude, which is similar to the common goal of sustainable development, and it means that security research by definition will cover a very broad area of disciplines and problem oriented research topics.

Perhaps the scope of security research work is best defined by the ESRAB report:

> *"….research activities that aim at identifying, preventing, deterring, preparing and protecting against unlawful or intentional malicious acts harming European societies; human beings, organisations or structures, material and immaterial goods and infrastructures, including mitigation and operational continuity after such an attack (also applicable after natural/industrial disasters)".*

Which area of research should we address to reap the most benefits to society and Swedish trade and industry? The challenge will be to see the whole picture and at the same time suggest limited research programmes/projects where Sweden has a potential to explore and develop profitable innovations.

[31] Knowledge to safeguard security, Proposals for a national strategy for security research (VINNOVA, June 2005)

The NRA will point out research efforts that companies and society need in order to develop appropriate systems that we can trust in. The NRA expresses both a supply and a demand driven perspective on the national research needed, addressing the need from a user as well as from a producer point of view in order to meet the demands from society as well as from industry to visualise a Swedish profile in the security area.

Structure

The Commission's ESRAB report was the natural starting point for the discussions of the NRA group as it represents a major effort of the union member states to describe the broad requirements of security research. It is also the base or model from which the Work Programmes of Theme 10: Security in the FP7 is developed.

The NRA group has chosen the capability-based approach and structure in the ESRAB report mapping Swedish capabilities in terms of on-going research and knowledge resources.

The ESRAB report lists the four FP7 mission areas:

- Protection against terrorism and organised crime
- Border security
- Critical infrastructure protection
- Restoring security in case of crisis

and the three cross mission areas:

- Integration, connectivity and interoperability
- Demonstration programmes
- Capabilities and technologies

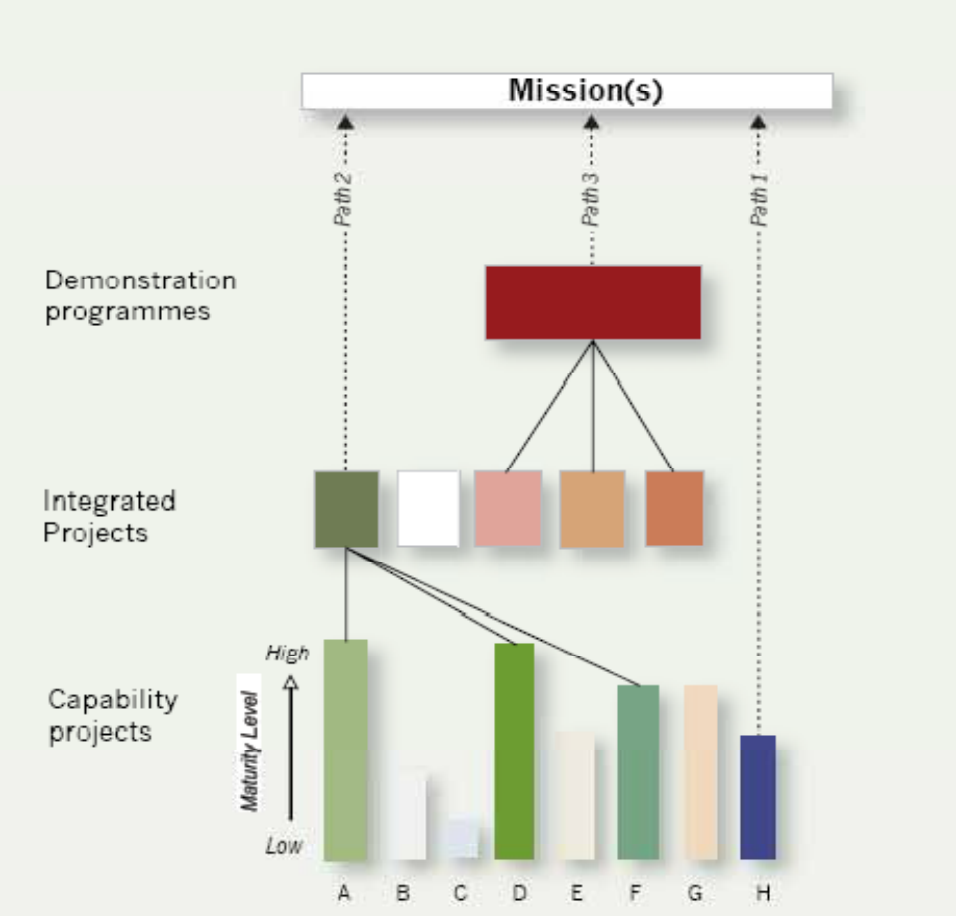
Interoperable secure communication is one important example of the first cross mission area in which Swedish industry has been actively involved over many years. The protection of the communication infrastructure and the challenges linked to the integrity of the infrastructure components and its management are highly prioritized research areas where Sweden has an innovative potential in existing research groups and businesses. This is also true for the important area of access control and authentication e.g. effective and easy-to-use biometric technologies.

Businesses and ICT research groups in Sweden are well equipped to take up the challenges posed by the five demonstration programmes proposed by the ESRAB report:

- Aftermath crisis management system
- European-wide integrated border control system

- Logistic and supply chain security
- Security of mass transportation
- CBRNE

The successful achievement of the implementation of the results of these programmes will depend on the compatible, complimentary and interoperable development of requisite system and technology "building blocks" which are linked to the missions, capabilities and the demonstration programmes. To actively be involved in the development of these "building blocks" is of major importance to the security research and business community.

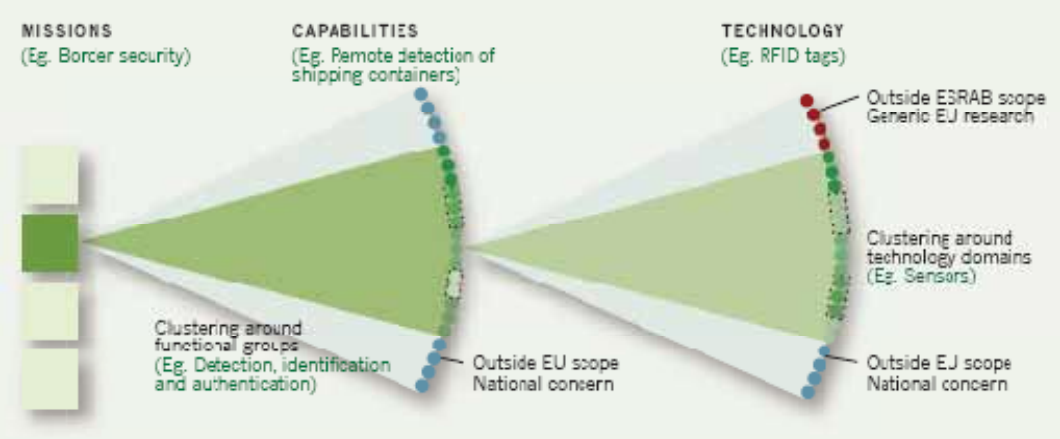


This figure shows the research paths. ***Path 1 – capability development****: technology development to improve the maturity level of a specific capability or a group of capabilities.* ***Path 2 – system development****: integration of a number of capabilities in innovative combinations to deliver operational performances.* ***Path 3 – systems of systems demonstration:*** *integrating a number of systems in which the integration and demonstration aspect represents the majority of the work. The successful achievement of the demonstration programmes is dependant on the compatible and synchronised development of the system "building blocks" of research paths 1 and 2. The demonstrations of systems of systems are seen as the "flagship" demonstration programmes providing a federative frame to coalesce research in areas of significant European interest.*

The capability approach

Capability development is the cornerstone of the technical research. Capabilities are seen as the principal building blocks for technological definition as they represent the smallest complete assembly of technologies and procedures that together lead to an ability to perform a specific function, task or operation. The capabilities were arrived at from a close analysis of the four security missions mentioned above.

The most frequent capabilities have been deployed into 11 functional groups and are called Multi-mission Capabilities. See Attachement 2.



The figure shows inter-linkages between the different nomenclatures, ***missions****,* ***capabilities - functional groups*** *and* ***technologies****.*

Priorities[32]

The NRA group has taken into account both Swedish research competence and the worldwide security market when deciding what technical domains to prioritise for further investments in research and development. The group has judged each of the priorities below being top key technologies to Swedish industry performance filling the criteria to be both of strategic importance for security technology and matching leading competencies of Swedish industry. Combined, they are fitted for systemic approaches that are in the scope of these companies. The Technical Domain priorities of the NRA are as follows.

1. ***Communication*** with priority technical areas:

Reconfigurable communications, mobile secured communications network management and control equipment, network supervisor, network and protocol independent secured communications, information security,

[32] Attachements No 1 and 2 explain how the investigation was made.

secured wireless broadband data links for secured communications, protection of communication networks against harsh environment.

2. ***Signal & Information technologies*** with priority technical areas:

Data and information fusion, sensors, data collection/data classification, image/pattern processing and data and information management.

3. ***Artificial intelligence and decision support*** with priority technical areas:

Text-mining/data-mining, IKBS/AI-expert techniques, knowledge management, modelling and simulation, optimisation and decision support technology.

4. ***Information security technologies*** with priority technical areas:

Encryption and key management, data-mining, access control, filtering technologies, authentication technologies, encryption technologies (cryptography).

5. ***Computing technologies*** with priority technical areas:

Protocol technology, SW architectures, secure computing techniques, high performance computing, high integrity and safety critical computing, software engineering.

To be able to build systems and “systems of systems” from the prioritised capabilities and other already existing capabilities the need for system engineering and integration skills are evident. Swedish industry has been in the frontline regarding integration capabilities and products. To further develop this area and taking into account the new Network Centric approach will strengthen the possibilities to offer cost efficient solutions to the customers and to gain new export markets. Sweden also has a unique position to influence the standardisation of these systems.

7 Actions and recommendations

- Actions to support innovative purchasing of R&D in collaboration with industry are recommended.
- RTD programmes should be designed for both mid-term and long-term horizons e.g. a framework programme until 2015 with a planning cycle of 3 years beginning in 2009.
- VINNOVA in collaboration with SEMA[33] should be the public part in a public-private initiative to design a complete strategy for security research well adjusted to the FP7 programme.
- Public contribution in a public-private investment plan should amount to about 30M€[34]. Industry should match this amount resulting in a long-term programme of 60M€.

[33] SEMA will be replaced by a new public authority 1 January 2009.
[34] SEMA has recommended a R&D budget for the new organisation of 200 MSEK per year. The above mentioned amount of 30M€ (not more than 40 MSEK per year) should be earmarked for export oriented service- and product developments and not be included in the 200 MSEK.

Attachment No 1:
The process of forming a Swedish National Research Agenda for security

In September of 2007 a group consisting of representatives from Teknikföretagen[35], VINNOVA[36], IF Metall[37] , FOI[38] and a few industrial companies proposed an action to formalise a Swedish agenda for security research.

Teknikföretagen asked VINNOVA to assist in this task.

A reference group (the NRA group) of interested parties was formed which consisted of the following persons:

Johan Ancker, Teknikföretagen
Mårten Armgarth, SICT[39]
Ola Asplund, IF Metall
Helena Bergman, FOI
Thomas Björklund, ABB
Rolf Blom, Ericsson
Carl-Johan Koivisto, Saab Group
Eva Lindencrona, VINNOVA
Lars Löfqvist, KBM, (SEMA)[40]
Svante Ödman, KBM, (SEMA)

Hans Henzell, SICT and Ulf Wahlberg, Ericsson were also involved initially.

John Graffman, formerly at VINNOVA and Christina Johannesson, FBA made notes during the meetings.

The group assembled 6 times during the period October 2007 to April 2008.

The chair at these meetings alternated between Eva Lindencrona and Johan Ancker.

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[35] See www.teknikforetagen.se "Teknikföretagen is the trade and employers' organisation for Sweden's most important companies".
[36] See www.vinnova.se Swedish Governmental Agency for Innovation Systems.
[37] See www.ifmetall.se IF Metall is a trade union.
[38] See www.foi.se Swedish Defence Research Agency.
[39] See www.sict.se Swedish ICT Research
[40] See www.krisberedskapsmyndigheten.se Swedish Emergency Management Agency.

The group agreed initially to the following overall goals:

The main purpose was to point out research needs that will strengthen Swedish companies and enhance their potential for export business as well as the domestic market.

Public authorities in Sweden and abroad should be natural customers for products and services that generate security for the benefit of citizens. These products and services will be based on R&D from the recommended areas of research in this report.

Approach

The intention was to find strong and promising Swedish research resources that will be able to underpin necessary capabilities needed for creating realistic security systems.

The Commission's ESRAB report was the natural starting point for the discussions of the NRA group. It is also the base or model from which the Work Programmes of Theme 10: Security in the Seventh Framework Programme are developed.

In accordance with ESRAB the Swedish NRA report for security research addresses the multimission capabilities organised in 11 functional groups which are necessary for safeguarding security by funding research that will deliver the required technologies and knowledge to build up these capabilities.

They are:

Detection, identification & impact reduction
Intervention & neutralisation
Risk assessment, modelling & impact reduction
Situation awareness & assessment (surveillance)
Training & exercises
Command & control
Communication
Doctrine & operation
Incident response
Information management
Positioning & localisation

Each one of the above functional groups consists of 2 – 4 different multimission capabilities chosen out of 120 capabilities identified in the ESRAB report. In total 35 multimission capabilities have been used in the Swedish NRA report.

A table listing the 35 capabilities in relation to the NRA group's "Need for knowledge, Having knowledge, Need for research and Doing research" was

completed. See Attachement No 2. The following group members filled in the form: ABB, Ericsson, SAAB, FOI, SICT and KBM. The table was also completed by the SME-D an association for small and medium sized enterprises (about 20 members) focusing on defence products and services.

The compilation of these 7 tables into one table resulted in a broad pattern with some centre's of gravity.

However the meeting of January 31, 2008 concluded that these data were not enough as a basis for the group to make necessary priorities.

The following decision was made:

The functional groups should be ranked by giving each capability a rating for market potential and a rating for assessed in-house research competence. These ratings were multiplied and the given points for each capability were then added together for each functional group.

This exercise was done by ABB, Ericsson, SAAB, FOI and SICT.
In the meantime FOI also assisted in the task of distributing relevant Technical Domains[41] to each capability.

The compilation of this material resulted in an overall ranking list for the eleven functional groups as presented in this report and it also guided us to the most relevant technology areas to consider for future research efforts.

The same meeting also had a discussion about generic technologies that agrees with common perception of Swedish research strengths crucial for building security systems. One overarching such generic technology or capability is **integration and interoperability of systems.**

[41] ESRAB report page 50 (23 Technology Domains)

Attachment No 2

From Table 6, ESRAB report

High frequency multi-mission capabilities		*Need knowledge*	*Having knowledge*	*Need research*	*Doing research*
Function	**Detection, identification and authentication**				
Capability	Detection of explosives, weapons, drugs,dangerous goods (CBRN)				
Capability	Detection of abnormal behaviour of living beings, platforms				
Capability	Access control via biometric identification and authentication				
Function	**Intervention and neutralisation**				
Capability	Incapacitating platforms, individuals and weapons				
Capability	Isolating individuals and groups of individuals through proactive and preventive crowd control				
Capability	Neutralising the effects of a CBRNE incident				
Function	**Risk assessment, modelling and impact reduction**				
Capability	Threat assessment modelling				
Capability	Risk assessment and response models for complex or integrated infrastructures and services				
Capability	Modeling of the modus operandi of organised crime and terrorism				
Function	**Situation awareness**				
Capability	Collecting or extracting data and finding patterns and correlations to indicate a specific hazard				
Capability	Presentation of data in a manner which aids human decision-making processes				
Capability	Continuous capture of surveillance data including from remote platforms				

High frequency multi-mission capabilities		*Need knowledge*	*Having knowledge*	*Need research*	*Doing research*
Function	**Training and exercises**				
Capability	Improve front line skill levels through training initiatives such as scenario and situation modelling, computer aided training and simulation				
Capability	Improve education of citizens on the manner in which to behave in case of crisis				
Capability	Test and audit of front line staff and facilities				
Function	**Command and control**				
Capability	Common operational picture shareable between all stakeholders via robust C&C systems, mechanisms and tools				
Capability	Information management - public broadcasts/media				
Capability	Alerting and broadcasting of abnormal behaviour in a timely, consistent and directive manner				
Capability	Tools and systems to facilitate intelligent decision support				
Function	**Communication**				
Capability	Physical integration of command, control and communication equipment and interface with portable platforms				
Capability	End-to-end interoperable secure communication infrastructure and services				
Capability	Fixed and mobile terminal and network access control via user authentication				
Function	**Doctrine and operations**				
Capability	Assess and realise back-up or redundancy capacity for selected infrastructures and services				
Capability	Produce customised contingency recovery plans for institutions and major strategic facilities				
Capability	Develop guidelines and procedures for designing, monitoring and responding to man made or natural disaster				
Function	**Incident response**				
Capability	Decontamination of individuals, platforms and infrastructures post attack				
Capability	Personal protection and equipment for first responders and civilians				
Capability	Forensics for faster trace testing of chemicals, explosives CBRNE on humans and objects				
Capability	Basic service and robust business continuity systems				

High frequency multi-mission capabilities		***Need knowledge***	***Having knowledge***	***Need research***	***Doing research***
Function	**Information management**				
Capability	Capabilities to provide data fusion/data mining/automatic information processing				
Capability	Ability to interrogate unstructured database repositories				
Capability	Semantics and topology development to facilitate data exchange				
Function	**Positioning and localisation**				
Capability	Identification, localisation and tracking of platforms, goods, containers, people, emergency services and inventories				
Capability	Observation of individuals through sub terrain, debris and fixed structures				

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See www.VINNOVA.se for more information

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02 Svenskt deltagande i EU:s sjätte ramprogram för forskning och teknisk utveckling. *Only available as PDF*

03 Nanotechnology in Sweden - an Innovation System Approach to an Emerging Area. *For Swedish version see VA 2007:01*

04 The GSM Story - Effects of Research on Swedish Mobile Telephone Developments. *For brief version in Swedish or English see VA 2008:07 or VA 2008:06*

05 Effektanalys av ”offentlig såddfinansiering” 1994 - 2004

06 Summary - The GSM Story - Effects of Research on Swedish Mobile Telephone Developments. *Brief version of VA 2008:04, for brief version in Swedeish see VA 2008:07.*

07 Sammanfattning - Historien om GSM - Effekter av forskning i svensk mobiltelefoniutveckling. *Brief version of VA 2008:04, for brief version in English see VA 2008:06*

08 Statlig och offentlig FoU-finansiering i Norden

09 Why is Danish life science thriving? A case study of the life science industry in Denmark

VA 2007:

01 Nanoteknikens innovationssystem. *For English version see VA 2008:03*

02 Användningsdriven utveckling av IT i arbetslivet - Effektvärdering av tjugo års forskning och utveckling kring arbetslivets användning av IT. *For brief version in Swedish and English see VA 2007:03 and VA 2007:13*

03 Sammanfattning - Användningsdriven utveckling av IT i arbetslivet - Effektvärdering av tjugo års forskning och utveckling kring arbetslivets användning av IT. *Brief version of VA 2007:02, for brief version in English see VA 2007:13*

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09 Summary - Effects of Swedish traffic safety research 1971-2004. *Brief version of VA 2007:10, for brief version in Swedish see VA 2007:07.*

10 Effects of Swedish traffic safety research 1971-2004. *For brief version in Swedish and English see VA 2007:08 and VA 2007:09*

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VINNOVA´s mission is to promote sustainable growth
by funding needs-driven research
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