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훈련국	미국	훈련기간	2019.11.5-2021.12.25
훈련기관	피츠버그 대학교	보고서 매수	107
훈련과제	안보/국방		
보고서 제목	한반도 비핵화와 평화정착 시대의 전력건설 정책 발전방안 연구		
내용 요약	<p>I. 개요</p> <ul style="list-style-type: none"> <li>○ 안보환경 변화, 안보위협 다변화, 첨단기술의 발전 등 한반도를 둘러싼 안보환경은 급격하게 변화</li> <li>○ 그러나 한국군의 전력건설 정책은 여전히 전통적 위협, 특히 북한에 대한 대응을 중점적으로 고려하고 있어, 변화하는 안보 위협에 효과적으로 대응하는데 한계 노정</li> <li>○ 국방/방위산업에 막대한 예산이 투입됨으로써, 방위산업의 경제적 가치 창출에 대한 국민적 기대 또한 높아지는 상황</li> <li>○ 세계 10위권의 경제 국가로서, 북한에 대응하면서도 전염병, 사이버 공격, 기후 변화 등 전지구적 안보 위협 대미 및 방위산업의 경제적 기여 등을 위한 전력건설 정책 변화 방안 모색이 필요한 시점</li> </ul>		

	<p>II. 안보환경</p> <ul style="list-style-type: none"> <li>○ 전통적 안보 위협이 여전한 가운데 비전통적 안보 위협이 새로이 등장하면서, 세계적으로 안보 환경이 빠른 속도로 변화하고 있음</li> <li>○ 특히 한국은 주변 국가들의 군사력 강화 경쟁, 북한의 위협에 대한 대응 등 전통적 안보 위협에도 대응해야 하는 반면, COVID-19 및 기후 변화 등 다양한 국제 안보 이슈에도 직면</li> <li>○ 현 정부 출범 초기 북한과의 관계가 개선되었으나, 2019 년 북·미 회담 결렬 이후 남·북·미 관계가 다시 경색국면에 접어 들었으며, 한국은 여전히 북한의 위협에 빈틈없이 대응하면서도 한반도 평화 도래 시기를 대비해야 하는 상황</li> <li>○ 미·중 간 안보·경제 경쟁을 비롯한 주변국들의 경쟁 심화, 극단주의 및 전세계적인 테러 발생 증가, 감염병·기후변화·사이버공격 등 비전통적 안보 위협도 다양화</li> <li>○ 특히 한국은 세계에서 가장 빠르게 성장한 국가로서, 전통적·비전통적 위협에 대한 국제사회의 책임감 있는 일원으로서의 대응정책 필요</li> </ul>
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	<p>III. 한국의 전력건설 정책</p> <ul style="list-style-type: none"> <li>○ 한국의 국방예산 규모는 세계 10 위 권이며, 2016-2020 년 간 세계 무기 수출 9 위 및 수입 6 위를 기록하고 있으며, 첨단 기술에 기반한 작고 효율적인 군대로 거듭나기 위하여 국방개혁 2.0 을 추진 중</li> <li>○ 한국의 전력건설은 위협분석에서 시작하나, 현재 위협분석은 북한에 집중되어 있어 한국군은 북한의 새로운 공격무기체계를 무력화하는데 중점을 두고 전력건설을 추진</li> <li>○ 이러한 catch-up 전략은 한국군으로 하여금 전장을 주도하는 데 한계를 부여하게 되고, 북한의 무기개발을 쫓아 지속적으로 새로운 방어체계를 개발해야 하는 상황에 봉착</li> <li>○ 또한 북한의 능력에 대응하는데 적합한 무기체계를 개발하게 되어, 수출 등 방위산업의 경제적 가치 창출에도 한계가 생김</li> <li>○ 한편으로는, 한국은 여전히 군·정부 주도의 전력건설 체계를 고수하고 있어, 민간이 첨단 기술 개발을 주도하는 현실에서 세계적으로 경쟁력 있는 전력건설 추진이 어려움</li> </ul>
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#### IV. 미국의 전력건설 정책

- 세계적 안보 위협의 다변화에도 불구하고, 미국은 혁신적이고 탄력적인 전력건설 정책을 통해 세계 안보 패권을 유지하고 있음
- 특히 세계 제 2 차 대전 이후 지속되고 있는 러시아(소련)·중국과의 군비 경쟁, 테러와의 전쟁, 사이버 공격 심화 등 다양한 안보위기를 효과적으로 극복해 왔음.
- 위기를 극복한 미국의 전력정책 중심에는 시대를 앞서가는 첨단 기술에 기반한 전력건설 정책이 자리함.
- 특히 현존하는 안보 위협에 대응하는 기술 개발과 동시에 장기적 안목에서 미래 기술을 전망하고 대비하는 전력정책이 미국이 세계 안보 환경 및 전장을 주도하는데 크게 기여하였다고 평가됨

#### [ 주요 전력정책 변화 연혁 ]

- 상쇄전략(Offset Strategy)은 미국이 첨단 기술 개발을 통해 안보위기를 극복하기 위한 정책으로, 1950년대부터 현재까지 3 차에 걸쳐 진행되고 있음.

	<ul style="list-style-type: none"> <li>○ 제 1 차 상쇄전략은 1950 년대 (구) 소련의 전통적 군비 우위를 상쇄시키기 위하여 미국이 가지고 있던 핵 능력을 발전시키는 기술을 개발하는 정책이었음</li> <li>○ 동 전략은 강대국 간 핵무기 보유 경쟁을 촉발시켰으나, 당시에는 미국이 적은 예산으로 (구) 소련에 대하여 군사력 우위를 차지하는데 기여</li> <li>○ 이후 (구) 소련이 핵무기 개발 등으로 안보격차를 좁혀오자, 제 2 차 상쇄전략을 통해 전장을 주도할 첨단 신기술을 장착한 무기 개발을 추진</li> <li>○ 제 2 차 상쇄전략에서는 Long Range Research and Development Planning Program 을 도입하여, 전력건설 정책의 중심을 장기적 관점에서의 전략적 첨단 무기 개발에 둠</li> <li>○ 그 결과 GPS, 스텔스 등 신기술이 개발되었으며, 이를 통해 미국은 1990 년대 세계 안보 패권을 유지하는 동시에 민간에의 기술 이전 및 산업화 정책을 통해 국방산업의 경제적 번영 기여도를 제고</li> <li>○ 2000 년대 이후 정보통신기술의 발달, 민간 부분의 기술 혁신 등으로 인해 중국·러시아의 기술 추격 및 테러 집단의 안보위협 가속화 등 새로운 유형의 안보위기가 발발</li> </ul>
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	<p>○ 미국은 이를 극복하고자 2014년 제 3차 상쇄전략을 발표하였으며, 현재까지 지속 추진 중</p> <p>[ 제 3 차 상쇄전략 ]</p> <p>○ 제 3 차 상쇄전략은 민간부분의 기술혁신을 주도하는 현대사회의 특징을 정부가 이해하고, 정책 전 과정에서 민간부문과의 협업을 장려한다는 데 주요한 특징이 있음</p> <p>○ 미국은 정책 도입 초기에 다양한 조직을 활용해 전력건설 정책 방향을 전환하는데 성공</p> <p>○ ACDP(Advanced Capabilities and Deterrence Panel)은 최고위 수준에서 정부내 다양한 기관 및 민간부문과의 협업을 추진하던 조직으로, 상기 정책을 도입 초기에 안정적으로 정착시키는 데 기여</p> <p>○ DIUx(Defense Innovation Unit - Experimental)는 민간부분의 첨단 기술의 국방분야 도입을 목표로 신설된 조직임</p> <p>○ 산업계에서 추구하는 수익모델, 일하는 절차 개선 등을 정립하여 민간부분이 국방산업에 적극적으로 관여하도록 하고, 특히 기술에 정통한 민간인들로 조직을 구성하여 군과 산업계 간 소통을 원활하게</p>
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	<p>하는 데 기여</p> <ul style="list-style-type: none"> <li>○ 실무 수준에서 민간부분과 성공적으로 협업하는 성과를냄으로써 전력건설 정책의 ‘일하는 방식’ 혁신하였으며, 현재 정식조직으로 편제되어 있음</li> <li>○ SCO(Strategic Capability Office)는 현존하는 기술을 새로운 안보 위협에 대응하도록 활용하는 혁신적이고 새로운 방법을 개발하였음</li> <li>○ 이는 새로운 정책 목표 달성을 위해 기존 조직을 활용한 좋은 사례이며, 특히 SCO 의 일하는 방식은 한정된 국방예산을 절감하는데 크게 기여</li> <li>○ 제 2 차 상쇄전략에서 추진했던 Long Range Research and Development Planning Program 을 15-20 년 이후의 안보환경 및 기술 발전을 예측하고 미리 대응정책을 개발할 수 있도록 개선</li> <li>○ CAPE(Cost Assessment and Program Evaluation)를 기존의 비용분석·평가 기능 보다 미래 군사력 건설 정책 분석에 집중하도록 하여 미래지향적인 정책 개발 수단으로 적극 활용</li> </ul> <p>[ 민간부분과의 협업]</p> <ul style="list-style-type: none"> <li>○ 제 3 차 상쇄전략을 계기로 미국은 국방분야에서</li> </ul>
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	<p>민간부분과의 협업을 강력히 추진</p> <ul style="list-style-type: none"> <li>○ 공공부분에서 개발된 기술을 민간에서 상업화하던 기존의 협업방식과 반대로 민간에서 개발된 기술을 공공부분에 도입하는 방식으로 진행</li> <li>○ 미 국방부는 예산 제약 하에서도 경제 위기 시기를 제외하고 국방 R&amp;D 투자를 꾸준히 증액하고 있으며, 중점분야를 선정하여 집중투자 하는 방식으로 예산 효율성을 제고</li> <li>○ 또한 R&amp;D 전담 조직을 신설하고 전력건설·군수 정책 등에 대한 주도권을 부여, R&amp;D 단계에서부터 전력건설·유지 전반에 관한 사항을 고려하도록 함</li> <li>○ 국방 R&amp;D 사업에 대해 종합적으로 정보를 공개하는 Defense Innovation Market 웹사이트를 구축, 관련 정보 공개 및 질의응답, 사업 참여 신청이 one-stop 으로 이루어질 수 있도록 함</li> <li>○ 특히 기밀사항을 제외하고 관련 정보를 최대한 공개하도록 하여, 민간이 국방 관련 새로운 전략을 제시하거나 기술 개발을 제안할 수 있도록 장려</li> <li>○ 기술혁신이 주도하는 전력건설 정책 구현을 위하여 민간의 독립연구개발, 복수 시제 제작, 공공·민간·학계 간 공동 R&amp;D 연구 지원 등 다양한 R&amp;D 지원제도를</li> </ul>
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	<p>도입하여 활용</p> <ul style="list-style-type: none"> <li>○ 최근 급격히 변화하는 안보 환경에 유연하게 대응하기 위하여 안보 정보를 과감히 공개하고, 전력건설 초기 단계에서부터 민간과의 적극적인 협력을 도모하고 있다는 점에 주목할 필요</li> </ul> <p>[경제적 가치 창출]</p> <ul style="list-style-type: none"> <li>○ 세계적으로 각 국가들이 국방산업에 지출하는 예산은 약 2조 달러에 달하며, 그 중 미국은 약 8천억 달러를 국방관련 분야에 지출</li> <li>○ 국제 방위사업 교역 규모는 2016-2020년 간 3백억 달러에 달함. 미국은 국제 무기 수출 시장의 37%를 점유하고 있으며, 상위 25개 민간회사 중 12개가 북미 지역 중 특히 미국에 기반</li> <li>○ 미국은 자국의 전 세계에 퍼져있는 동맹·우호국들과 국제 안보를 안정적으로 수호한다는 안보정책 함께 자국의 방위산업을 육성하는 전략을 취함</li> <li>○ 법률 및 국회의 통제에 기반하여 동맹·우호국에 대한 국방 물자 및 군사 교육 제공, 미국과 상대국의 안보를 동시에 확보하기 위한 자금 지원 등 다양한 수단을 통해 자국 방위산업의 영토를 세계로 확장</li> </ul>
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	<ul style="list-style-type: none"> <li>○ 특히 국가안보·국방 분야의 특성을 이용하여 정부가 적극적으로 개입하는 형태의 거래 방식을 통해 국가 및 민간의 이익을 동시에 보호하려고 노력</li> <li>○ 정부를 통해 국방 물자를 수출하거나, 개도국이 자국 방산물자 수입 시 경제 여건을 고려하여 자금을 분할상환 받기도 함</li> <li>○ 직접적인 수출 지원 외에도 지속적으로 동맹·우호국군 대상의 군사 교육·훈련 프로그램을 운영하여 외국군이 자국 방위산업 무기 및 물자에 익숙해질 수 있는 기회를 제공하고, 방산물자 수출 기업 대해서는 기술료를 면제하기도 함</li> <li>○ 정부 내 방산물자 수출 전담 조직은 없지만, 국방부·국무부를 중심으로 관련기관들이 유기적으로 협조하여 방산물자 수출을 지원</li> <li>○ 국방부 산하 국방안보 협력 기관에 전반적인 방위산업 수출 정책을 총괄하고, 지원 사업을 운영. 특히 미국의 방위산업 우위를 유지하기 위한 정책 수립 기능도 수행</li> <li>○ 국무부 산하에서는 수출 물자에 대한 통제 정책, 경제·군사적 지원 규모 및 교역조건 검토 등을 수행하고, 각국 주재 미국 대사관에 군인·민간인을</li> </ul>
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채용하여 수출 지원 및 업무를 담당하도록 함

## V. 한국에의 정책적 함의 및 정책 제언

### [ 정책적 함의 ]

- 대북 관계의 유동성, 국제적 안보 위협 다변화, 첨단 기술 혁신 가속화 등의 안보 환경에 유연한 대응을 위해서는 북한 위협에의 대응을 중심으로 건설해 왔던 한국의 전력건설 정책 방향을 전환할 시기임
- 장기적으로 대북 관계가 안정되어 가는 과정에서도 발생할 수 있는 안보 위기에 대한 대응, 한국 국방력의 외연 확장 등을 위한 정책적 도약을 도모할 필요
- 특히 미국이 국제적 안보질서가 유지되는 상황에서도 발생했던 여러 차례의 안보 위기를 극복하는 단계에서 사용했던 미래 예측 및 전장 주도 기술 개발 노력에 주목
- 미국은 사회적 변화를 시의적절하게 인정하고 과감하게 일하는 방식의 변화를 도모하였으며, 이는 특히 안보 위협이 다변화하고 민간의 기술 혁신이 국가 안보 환경 자체를 변화시키는 현대 사회에 반드시 필요한 변화임

	<p>○ 또한 R&amp;D 지원 예산 확대 및 끊임없는 제도 정비를 통해 국가안보 영역의 민간 사업체가 진입할 수 있는 장벽을 낮추고 있으며, 국가안보 정책의 큰 틀 안에서 자국의 경제적 이익을 도모할 수 있는 통합적 정책을 추진</p> <p>[ 정책 제언 ]</p> <p>○ 한국도 대북 방어 전력건설과 동시에 전장을 주도할 수 있는 전략을 고민하고 개발해야 할 필요가 있으며, 초기 단계부터 민간의 혁신적인 아이디어와 기술 개발을 적극 활용할 필요</p> <p>○ 민간부분의 참여를 확대하기 위해서 군의 정보 공개 확대가 선결되어야 함. 필요한 정보를 공개하는 것이 아니라 기밀이 아닌 정보는 모두 공개하는 방식으로의 전환이 필요. 특히 기밀 여부는 가급적 보수적으로 판단되어야 할 것임</p> <p>○ DIU 와 같이 기술에 정통하고, 민간부분을 이해할 수 있는 조직·인력 보강이 전력건설 정책 전반의 혁신을 이끌 수 있음</p> <p>○ 소규모 R&amp;D 지원, 민간·학계 공동 R&amp;D 지원 확대를 통해 민간사업체의 국방산업 진입 장벽을 낮추어</p>
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	<p>혁신적 아이디어가 국방정책 및 산업을 이끌 수 있는 기반 조성</p> <ul style="list-style-type: none"> <li>○ 방산물자의 수출 자체에 집중하기 보다는 대북관계의 유동성 및 다변화 되는 국제적 안보위협에 대하여 적극적인 대응 전략을 수립하는 등 국가안보·국방정책과 연계하여 장기적인 관점에서 전략적으로 방위산업 수출시장을 확대할 필요</li> </ul>
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**The Future Directions in the Force Enhancement Policy of  
South Korea  
in the Era of Uncertainty and Peace Pursuing**

Dec. 2021.

Ministry of National Defense

Hee Mun

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- 1년차 3학기 대학원 수업 (30학점), 2년차 풀타임 인턴십으로 구성
- 인사혁신처와 MOU를 통해 학생들의 원활한 학업 수행을 위한 행정/재정  
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## **I. Introduction**

National Security aims to protect a nation from various threats. As the society has been specified as well as complicated and new technologies have been developed rapidly, a nation should prepare to defend its territory and people against not only conventional threats, invasions or wars, but also new forms of threats, cyber attacks, pandemic, or climate changes. In recent years, the possibility of huge wars such as World War I or II seems to shrink in most areas except civil wars or regional conflicts, whereas the possibility of new types of common threats happening are going up to every nation.

However, the Republic of Korea, hereinafter “South Korea”, still faces high risks of both threats, confrontation with North Korea and exposure to world-wide threats. First of all, South and North Korea has still been in armament status since 1953, in which the war may restart at any moment. That is why South Korea has developed its defense weapons systems against North Korea after Korean War, which seems to overwhelm North Korea’s weapons systems. In addition, it also has kept a strong alliance with the United States of America which provides nuclear deterrence against North Korea’s threats and activities of nuclear weapons. Although all the efforts, nevertheless, South Korea has still exposed to the risks that North Korea may invade into South Korea and invested huge budgets to prevent a war and prepare to win over North Korea.

Secondly, global threats should be treated as prior national security issues

in South Korea as well in other countries. New types of threats tends to influence globally such as pandemic, cyber attacks, and climate changes, so South Korea cannot be an exempt from those global security threats as well as has a responsibility as well as a capacity to contribute to the more secure and safer world as a member of global society being the nearly 10th largest economy in the world.<sup>1</sup>

Though considering North Korea is an immediate and visible threat, the government of South Korea should seek for efficient and effective ways to secure its security from not only conventional threats bur also new types of threats. Currently, South Korea has focused on defending its own from North Korea under limitation on the national resources, which would keep spending a more amount of budget every year without revolutionary innovation in the force enhancement system. However, South Korea should look for the way to participate more deeply in the international cooperation through its well-developed technologies as well as creative human resources.

In addition to that, elected administrations have tended to want the budget for the defense industry to create more values economically as the more amount of budget was spent in the national security. South Korea spent about 45 billion dollars on defense sector in 2020, which was the 10th largest amount in the world

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<sup>1</sup> South Korea was placed in the 12th in the GDP Ranking announced by the World Bank. OECD also forecasted that the amount of GDP of South Korea would be within the 10th place in the world in 2020.

and approximately 2.5% of its own GDP. Especially, the budget on the enhancement of weapon systems, obtaining or strengthening weapons by developing or buying, was 14 billion dollars in the same year. The rate of increasing the budget of enhancement weapon systems was 8.5% compared to in 2019, and it showed 6.3% of the increasing rate during past 10 years according to Ministry of National Defense of South Korea in 2019.<sup>2</sup>

For those reasons, the current administration set the core visions in the defense sector; to keep peace through overwhelming strength over North Korea up to being able to destroy the North Korea regime once it provokes South Korea, to respond to diversification and widening scopes of transitional and non-military threats, and to contribute to the national economy through exporting defense industry produces.

The Ministry of National Defense is faced to new challenges of being ready to prevent and respond new threats and creating economic value in addition to strengthening its essential mission of defending the nation from conventional threats. Starting from currently raised challenges, this research would take a look of the national security environment, analyze the current force enhancement system of South Korea and define the problem of causing inefficiency in the procedure, and find the resolution from studying the force enhancement systems of the USA which keeps the first place in the military weapon development.

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<sup>2</sup> Ministry of National Defense of South Korea announced its budget for 2020 voted in National Assembly on Dec. 10, 2019.



## **II. National Security Environment**

### **Overview**

The world faces unprecedented “rapidly changing security environment” (Department of Defense, 2014) The traditional threats such as conflicts among nations which compete for the hegemony in the region as well as the world persist existing; regional conflicts even becomes stronger around the world in the form of extremism. In addition, new types of perils emerge: cyber terrors, climate changes, and pandemic.

South Korea is also exposed to complicated national security environment; even it is facing more serious circumstances in that: its conventional threat, North Korea, does not seem to make improvement easily in spite of policy shifts after regime transition in 2017, and neighbor countries of South Korea have been not only competing in force enhancement but also widening the scope of military operations. Moreover, the speed and range spreading unconventional threats of pandemic like COVID-19 and climate change have been accelerating and widening throughout the world.

### **Conventional Threat: North Korea**

South Korea, still being in armament status with North Korea, is especially exposed to a more complicated national security circumstance. Its

conventional threat, North Korea, has still shown its hostility to South Korea. Specifically, as a conventional threat, North Korea has been the most threat to South Korea since Korean War in the early 1950s. It has strengthened its ability for sustaining wars through enhancing conventional weapons performances as well as building up asymmetrical force capabilities. Especially, North Korea has recently focused on developing asymmetrical weapons such as nuclear weapons, weapons of mass destruction, missiles, submarines, and cyber units in its military organization according to Ministry of National Defense, South Korea (2018, p 19).

However, the relation between South and North Korea has been fluctuated especially right after the current President was elected in 2017. The current administration has aimed to bring peace and prosperity to the Korean peninsula as one of the main visions of the regime. Specifically, this administration has emphasized solving North Korea's nuclear issues and building trustful as well as virtuous relationships between inter-Korea through sustainable dialogue channels and cooperation in various sectors of both societies as the National Security Council described (2018, p 10).

This aim and effort to achieve it worked effectively at the beginning of the regime. The administration held inter-Korean summit three times and contributed to the first the United States of America and North Korea summit (Ministry of Foreign Affairs, 2020, p17), so the relationship between inter-Korea and the US-North Korea seemed to be improved in such a short period. Especially, two

summits of South and North Korea signed *Panmunjom Declaration on Peace, Prosperity and Reunification of the Korean Peninsula* and *Pyongyang Joint Declaration of September 2018* to achieve permanent peace and prosperity to Korean peninsula. Specifically, *Panmunjom Declaration on Peace, Prosperity and Reunification of the Korean Peninsula* signed in April, 2018 included promises on:

[A]chieving comprehensive and epochal improvement and development in inter-Korean relations, ... defus[ing] the acute military tensions and to substantially removing the danger of a war of the Korean peninsula, and actively cooperat[ing] to build a permanent and stable peace regime on the Korean peninsula.

Also, in *Pyongyang Joint Declaration of September 2018* was stated:

The two leaders of South and North Korea assessed the excellent progress made since the adoption of the historic Panmunjom Declaration, ... [and] reaffirmed the principle of independence and self-determination of the Korean nation, and agreed to consistently and continuously develop inter-Korean relations ... and to make efforts to realize through policy measures the aspiration and hope of all Koreans the current developments in inter-Korean relations will lead to reunification.

Additionally, “the *Agreement on the Implementation of the Historic Panmunjom Declaration in the Military Domain* was adopted as an annex to *Pyongyang Joint Declaration*”, through which both leaders agreed to “expand the cessation of military hostilities in regions of confrontation” and “a fundamental resolution of the hostile relations” as noted in *Pyongyang Joint Declaration 2018*. This clause was evaluated a milestone of Korean peninsula without war. (Ministry of Foreign Affairs, 2020, p 17) Besides, two summits of the United States of America and North Korea in Singapore in 2018 agreed on *Joint Statement of President Donald J. Trump of the United States of America and Chairman Kim Jong Un of the Democratic People’s Republic of Korea at the Singapore Summit* including:

commit to establish new U.S.-DPRK relations in accordance with the desire of the peoples of the two countries for peace and prosperity, join their efforts to build a lasting and stable peace regime on the Korean Peninsula, commit to recovering POW/MIA remains, and, [North Korea] commits to work toward complete denuclearization of the Korean Peninsula.

However, North Korea has turned to the passive attitude on dialogue and cooperation with South Korea and the United States of America after the US-North Korea summit was broken down in 2019. North Korea has kept increasing the number of conventional weapons and strengthening its nuclear and missile ability advocating its own self-defense capability although facing the harsh

environment forced by not only sanctions the international society imposed but also economic difficulties COVID-19 caused since 2020 according to Ministry of National Defense. (2020, p 19)

The efforts to reduce the possibility of war in Korean peninsula and to make a progress in reunification of two countries have not brought a stable and meaningful turn-around moment in inter-Korea relationships yet. So, South Korea has still been required to prepare for provocations from or a war against North Korea.

### **Non-conventional Threats: Potential or emerging threats**

On the other hand, in terms of the Asia-Pacific region and international society, South Korea is also exposed to various threats. The neighbor countries have been competing on not only exerting influence but also engaging arms race in the region as well as the world. The possibility of provocations and aggressions has also increased arising from conflicts of territories, religions, and ethnicities. Besides, the scope of the transnational and non-military security threats factors have been diversified and widened, which requires to cooperation of the whole international community.

First of all, in the Northeast Asia is growing uncertainty. Strategic competing has increased between the United States of America for decades in economy as well as military. Japan and Russia has also participating

competitively in arms race focusing on naval and air forces to enlarge its influence strategically. Especially, between the United States of America and China has increased reciprocal dependence in economy; on the other hand, the number of trade conflicts has been also surged. Those hypocritical phenomena may have uncertainty of the regional security environment in Northeast Asia under the circumstance that the cooperation in security sector has not worked well.

Secondly, the number of regions holding the possibility of provocations from various factors has increased; North China Sea, Israel and Middle East, political instability in North Africa region, and emergence of terrorism at everywhere in the world. These potential conflicts concerning not only territorial land and sea but also maritime sovereignty of nations may affect geopolitical interests or nationalism, so they are highly able to ignite accidental military crashes.

Last but not least, non-conventional threats have called attention to international society. The acceleration of networking has spread extreme nationalism, terrorism, and cyber attacks widely and fast. Instability of global economy is also one of non conventional threats which resulted from expansion of economic inequity of region and nations as well as protectionism in trade, and hegemony competition in trade and finance markets in the world. It may affect national security of individual countries with connections to depleting resources and widening the wealth gap between nations or regions. Besides, problems of

huge nature catastrophes, pandemic, drug trafficking, and refugees have mattered as affected factors in global security. Those non conventional threats are required for the whole world to cooperate in solving them.

South Korea, as one of the countries accomplishing the most remarkable growth, would build up capabilities to correspond those threats with its initiative. South Korea has had no luxury to spend its budget and efforts to contribute to global security because it has faced its most threat, North Korea. However, it should respond global security crisis as well as North Korea's threat at the same time. The improvement of relation with North Korea would help South Korea afford to solve global security and vice versa; the more stable global and regional security environment become and the more influence South Korea has on global security, South Korea would have more chance not only to lead relationship with North Korea but also to have more support of global society.

### **III. Policy for Enhancing Weapon Systems in South Korea**

#### **Current Policy**

South Korea took 9<sup>th</sup> place in market share of the leading exporters of major weapons between 2016 and 2020<sup>3</sup> and 7<sup>th</sup> place in market share in the import of major arms during the same period<sup>4</sup> as Statista published (2021, Figure 1 and 2). It also has been recorded as the 10<sup>th</sup> largest countries concerning defense spending. The budget spent on armament has grown steadily; meanwhile, the amount of defense industry export has been shrunk although the current administration set to expand contribution to the national economy as one of the main visions in defense area. In 2019, the amount of arms export of South Korea was assumed 1.5 billion dollars, which decreased 35% comparing in 2016. (Yang, 2020)<sup>5</sup>

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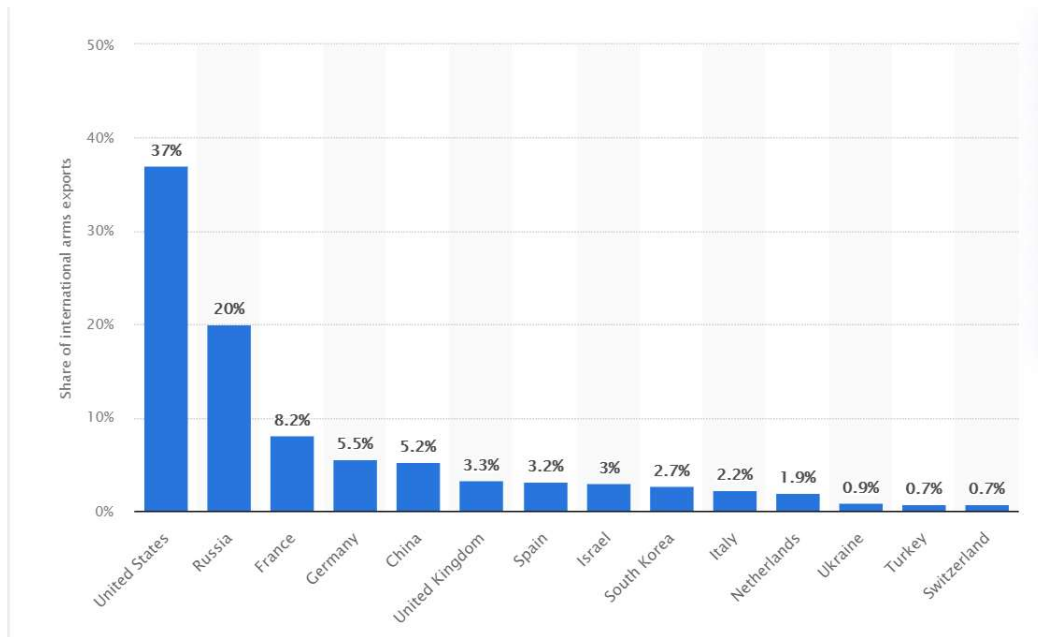
<sup>3</sup> Market Share of the leading exporters of major weapons between 2016 and 2020, by country. Retrieved from <https://www.statista.com/statistics/267131/market-share-of-the-leading-exporters-of-conventional-weapons/>

<sup>4</sup> Market Share in the import of major arms between 2016 and 2020, by country. Retrieved from <https://www.statista.com/statistics/267134/share-of-individual-nations-in-the-import-of-conventional-weapons/>

<sup>5</sup> The Defense Acquisition Program Agency of South Korea announced in 2015 that the official statistics of arms trade would not be published considering national interests. However, it restated in 2020 that the significant statistics regarding defense industry would be published.

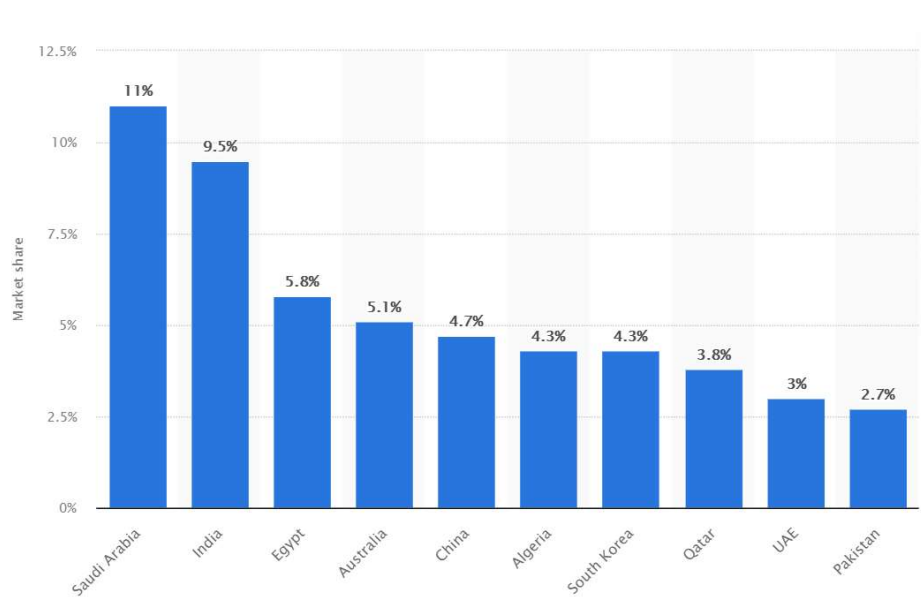


**Figure 1. Market share of the leading exporters of major weapons between 2016 and 2020, by country**



Source. Statista (2021)

**Figure 2. Market share in the import of major arms between 2016 and 2020, by country**



Source. Statista (2021)

Meanwhile, South Korea has been in the process of the Defense Reform 2.0 that would recreate her military as “smaller but more technologically advanced and operationally effective armed forces”, according to Ministry of National Defense (2020), to raise capabilities of defending its territory and population from existential and potential enemies and threats. For that, military of South Korea should strengthen military capacity based on technology. In modern wars, creative strategies based on new weapon systems as the collective results of cutting edge technology. Considering that, South Korea should develop its own strategic weapon systems not only to strengthen its capacity but also to shrink its size.

## **Problems**

The military of South Korea normally starts with threat analyses to introduce new weapon systems, which process has been really focused on North Korea’s military ability. This process has led South Korea military strategy to catch up to responding only enough to North Korea’s offense weapon systems after Korean War in 1950s. In the past, it took a few decades for North Korea to develop new weapon systems for beating over South Korea’s defense systems.

However, this catch-up strategy has faced its limitation these days, which technology has been developed so rapidly. As soon as, or even before, South Korea succeeds in equipping its defense weapon system against North Korea’s new offense armament, North Korea announces new ones which South Korea has

to newly seek how to defense. South Korea would rarely lead its combat field with this force enhancement procedure although costing a large amount of budget on developing weapon systems. It is the time for South Korea to figure the strategy using its well-developed technology to create its battle field which is favorable to its own.

Moreover, the catch-up strategy hardly affects positively creating economic values from the defense industry. It pushed South Korea to be satisfied with armaments only enough to defend North Korea's attacks, so its capacity to develop new weapon systems for the world-wide security would shrink. Not only that, this tactic lets South Korea to prefer purchase new weapon systems abroad to developing on its own- which way takes more time as well as has uncertainty at its final success. It also makes research and development ability of South Korea to shrink in the long term.

On the other hand, South Korea military has been immersing into government led development strategy. Military still has requested very specified RFP even under the circumstance that they do not know what kind of technology are existing and have potential to be developed. They insisted having information of useful technology in defense, but the information sometimes was offered by and depended on specific companies which wanted to be funded by the government. It may be connected to low lever technology compared to current or near future technology or ever corruption. Moreover, those weapons cannot be exported.

## **IV. Study of the Force Enhancement System of the USA**

### **1. Introduction: Reasons to Study the United States of America**

The United States of America has been exposed to conventional threats from Russia after World War II and China these days concerned with holding the world's hegemony. Also, it has faced directly new types of threats such as terrorism or cyber attacks from not only national entities but also non-national ones. In spite of these threats, however, the United States of America is still placed in the most powerful nation of the world with regards to national security as well as economy. Specifically, the United States of America has not only built the highest military capability against variable threats but also had the largest scale defense industry in the world.

When facing crises of national security, the United States of America tried to find breakthrough. Each critical momentum to keep its superiority in the security was built on the cutting-edge technology in those days. Chuck Hagel, the former Secretary of Defense, evaluated prior strategies as “moderniz[ing] [the] nation’s capabilities and sustain its operational and technological edge” in his speech at Reagan National Defense Forum in 2014.

In the 1950s, President Eisenhower successfully offset the Soviet Union’s conventional superiority through his New Look strategy building up of America’s nuclear deterrent. In the 1970s, Secretary of Defense Harold Brown,

working closely with Undersecretary – and future Secretary of Defense – Bill Perry, shepherded their own offset strategy, establishing the Long-Range Research and Development Planning Program that helped to develop and field revolutionary new weapon systems. (Hagel, 2014)

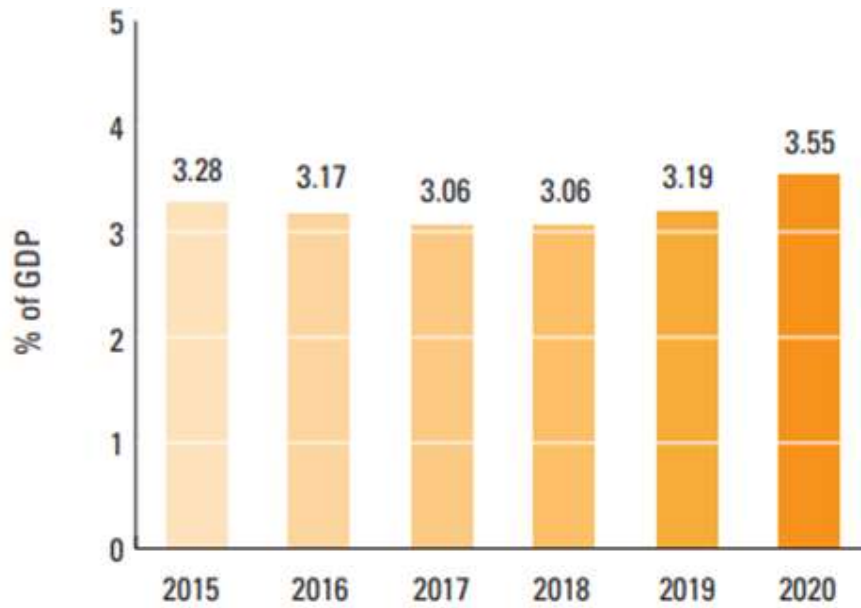
Secretary of Defense Hagel (2014) also announced at that moment “a new Defense Innovation Initiative ... to develop into a game-changing third ‘offset’ strategy,” which has kept going on so far regardless to change of regimes, as a key strategy for sustaining its dominant position in national security for over decades. There have been various evaluations and critiques regarding continuous evolving ‘offset’ strategies. However, it seemed obviously that those efforts of the United States of America have contributed to making its nation to lead the world order over a half century throughout several critical crises in national security.

According to IISS<sup>6</sup> (2021), as of 2020, the United States of America still spends 3.55% of its GDP on defense to sustain its dominance in national security. It is the world’s largest scale although it has decreased slightly in 2019 and 2020. (Figure 3 and 4)

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<sup>6</sup> International Institute for Strategic Studies (IISS), established in 1958, London, is a research center in the fields of international affairs and national security. It aims to help to shape the strategic agenda for governments, businesses, the media and experts across the world.

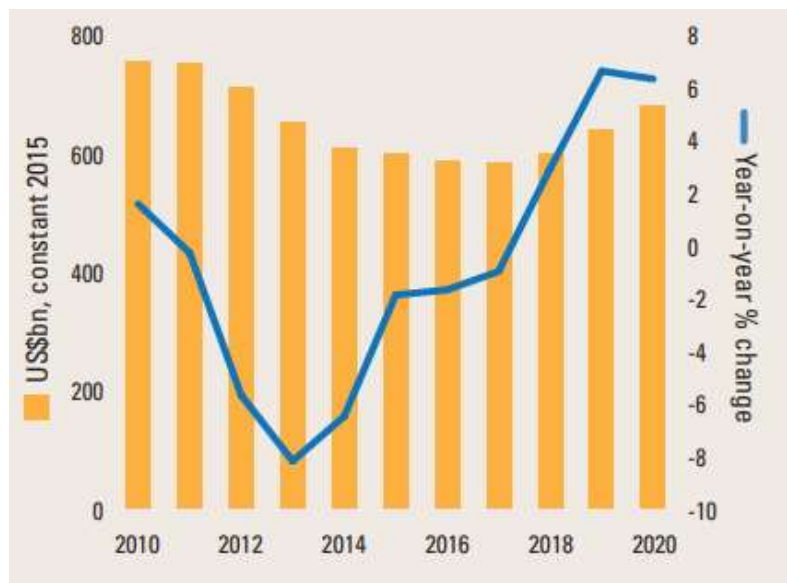
**Figure 3. US Defense Budget as % of GDP**



Source. International Institute for Strategic Studies (2021)

Note: Figures refer to the National Defense Budget Function (Outlays) as a % of GDP.

**Figure 4. US Real-Term Defense Budget Trend, 2010-2020**



Source. International Institute for Strategic Studies (2021)

## **2. History of Offset Strategies: Leveraging Technological Advantages**

### **Introduction**

The United States of America has experiences of overcoming its national security crises through “leveraging its own technological advantages” as mentioned in *Toward a New Offset Strategy* written by Martinage (2014).

Two notable examples were President Dwight D. Eisenhower’s “New Look” in the early 1950s and Secretary of Defense Harold Brown’s “Offset Strategy” in the mid-1970s. In both instances, the mechanism for affordably “offsetting” the numerical conventional force imbalance relative to the Soviet Union was the same: leveraging U.S. technological advantage. (Martinage, 2014)

Chuck Hagel, the Secretary of Defense, also announced the “Defense Innovation Initiative” known as “Third Offset Strategy” as a method to “develop into a game-changing” strategy in his speech at Reagan National Defense Forum in 2014. The reason Department of Defense inherited the legacy of offset strategy is the experience that the strategy worked as key solution when the country was in national security crisis. In this chapter would be shown why each offset strategy emerged, how it worked for the national security of the United States.

### **The First Offset Strategy: New Look**

The first offset strategy started from the question after Korean War: “what if the USSR’s strategy was to provoke more such wars at a time and place of its own choosing?” (Grier, 2016, p 57) In early 1950s, the Soviet Union had the superiority to the United States in conventional forces around Europe: 175 divisions in USSR verses 25 divisions in the United States. (Park, 2019, p 83)

Under budget restrictions, the President, Dwight D. Eisenhower, decided “a strategy of asymmetry,” which was to counter the Soviet Union’s threat to expand its influence outward with the threat of a response with nuclear weapons according to Grier (2016, p 58). The United States of America took the advantage from their already-owned nuclear weapons at most; 841 atomic warheads available - while the Soviets had estimated 120 - and nuclear delivery capability. (Grier, 2016, p 58) So, “Department of Defense conduct[ed] and foster[ed] scientific research and development so as to insure [current] superiority in quantity and quality of weapon systems although the percentage of the defense budget of [the United States of America] GDP dropped from 14 percent in 1953 to less than 10 percent later.” (Wellman, 2019, p 18; Grier, 2016, p 59)

The technological superiority of the United States over the Soviet Union gave the chance to change the rule in battlefields to the United States of America. Park emphasized (2019, pp 83-84) two main achievement from the First Offset; first of all, the United States of America was able to operate superior nuclear



weapons strategically and tactically for responding to overwhelming conventional forces of the Soviet Union; secondly, the United States gained the advantage to deploy strategic asymmetrical forces whenever and wherever it wanted to operate.

The first offset strategy was evaluated as being successful to deter the war during the Cold War era for the United States to take advantage from the comparable competitiveness of strategic forces without pouring the budget on defense although it stimulated the arms race between the United States and the Soviet Union according to Grier and Wellman (2016, p 60; 2019, p 18) “New Look Strategy” to keep superiority in technology had brought effective deterrence period for over a decade to the United States of America.

### **The Second Offset Strategy:**

The second offset strategy starting in 1970s was actually the first offset strategy which was named with the term of “offset.” as Defense Secretary Harold Brown stated in 2014. In response to Eisenhower’s New Look of the United States of America, the Soviet Union “reinvigorated its own nuclear weapons program, ultimately surpassing the United State nuclear programs” as well as reinforced its conventional forces with modernized weapons and sizeable manpower in Europe. (Wellman, 2019, p xi; Park, 2019, p 83; Seitz, 2019) Thus, under intensified arms race, the United States of America undertook “to leverage technology to improve its position relative to the Soviet Union and their allies”

according to Seitz (2019). Wellman (2019) also stated the object and the main contents of the second offset strategy as

[t]o offset [forces of the Soviet Union], and to regain the strategic advantage, the [Department of Defense] implemented the Second Offset in the 1970s, which developed superior technology in standoff weapons, precise targeting weaponry, and stealth capabilities to overcome and deter Communist nuclear superiority.

Department of Defense began to seek the opportunity to regain its eminent status in military forces in superior technology and, at the same time, invest its resource to develop more capable forces with fewer amount of budget (Park, 2019, p 84). The effort to achieve the aim of the Second Offset strategy describing above was mainly associated with the Long Range Research and Development Planning Program, hereinafter “LRRDPP” (Gentile et al. 2021, p 15). LRRDPP started with analyzing in the beginning that

... military capabilities that had the potential to make a significant difference in [the United States of America’s] ability to cope with aggression; ... [p]ossible weapon and support system concepts that show considerable promise of providing these capabilities more effectively; and ... technology programs that would have to

be initiated or expanded to bring these concepts into reality.<sup>7</sup>

Then, LRRDPP participants “identif[ied] improved military capabilities needed ... in future conflicts” and “assessing the future state of the art of ... advanced weapons systems by certain key technologies.”<sup>8</sup> As a result, they recommended technology investment which was able to “reshap[e] the battlefield of the future.”<sup>9</sup> The fruit of the investment for the Second Offset strategy appeared increasing ability of precise targeting by “advanced sensors for weapon guidance, data links, high-mobility vehicles, improved communication systems [based on satellite networking], cruise missiles, and remotely piloted vehicles”<sup>10</sup> including intelligence, surveillance, and reconnaissance (ISR) and stealth technologies according to Park and Wellman. (2019, pp 84-85; 2019, pp 19-20)

The Second Offset strategy was continuously inherited for decades with support of country’s leadership. Defense Advanced Research Project Agency, hereinafter “DARPA” mostly executed research and development related to the Second Offset strategy and obtained highly evaluated achievement. One of the critical factors for DARPA to make its long term project successful was the

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<sup>7</sup> Unknown. (n.d.) Long Range Research and Development Plan (LRRDP) Request for Information, p 3. Retrieved from [https://defenseinnovationmarketplace.dtic.mil/wp-content/uploads/2018/02/LRRDPP-RFI\\_Final-FebExtension.pdf](https://defenseinnovationmarketplace.dtic.mil/wp-content/uploads/2018/02/LRRDPP-RFI_Final-FebExtension.pdf)

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

continued support and growing budget from successive administrations regardless political party of administrations according to Seitz (2019).

The forces developed during the Second Offset strategy showed the effectiveness not only in the Gulf War in early 1990s as well as Iraq War in 2000s, (Park, 2019, p 85; Seitz, 2019) as the former Secretary of Defense Perry (1991) evaluated himself

[the technology developed through the Second Offset strategy] gave American forces a revolutionary advance in military capabilities. ... An army with such technology has an overwhelming advantage over an army without it, much as an army equipped with tanks would overwhelm an army with horse cavalry.

By the Second Offset strategy, the United States military was able to do targeting precisely with its highly technology forces and simultaneous integrated information, which brought to her the “unprecedented victory.” (Seitz, 2019)

There were surely other factors for the United States of America to gain in upper hand with regards to national security during this period such as well-trained service members and extraordinary leadership as well as cooperation and military capability of the allies in the region as Seitz (2019) mentioned. A skeptical critique, on the other hand, was also found in that many weapons and

technologies were not used and not capable than expected, or even conventional weapons, compared to the cost for the development as Park (2019, p 85) stated. However, the newly developed forces should not be underestimated especially considering that intelligence, surveillance, and reconnaissance technology did a critical role for the United States to gain the upper hand in wars during 1990s and 2000s as Park noted in his research (2019, p 85). The forces with high technology would not guarantee a victory in every war, but they would expand the range of strategy and tactics in military operation which may increase the possibility of triumph.

Besides strengthening the military forces with technology and sustaining dominant status of the United States of America in national security, the First and Second Offset strategy led innovation of technologies such as Internet, Global Positioning System (GPS) and Information Technology (IT). Those technologies were transferred into private sectors, which eventually paved the way for economic prosperity of the United States of America throughout the science and technology after World War II.

### **The Third Offset Strategy: Defense Innovation Initiative**

The Third Offset, named as “Defense Innovation Initiative,” emerged in the recognition of national security crisis from China and Russia’s increasing military capabilities during the United States of America deploying military to Afghanistan and Iraq according to Gentile et al (2021, p ix). With rapidly

evolving technologies and widely spread information, China and Russia have narrowed the gap of military capabilities between the United States of America and them. To sustain its advantage, the United States of America needed to develop new strategies; meanwhile, the fiscal environment was not favorable to expand the amount of investment in defense. (Department of Defense, 2014, p IV) Therefore, the objective of the Third Offset strategy should embrace both to invoke advanced-technological innovation to offset military capability of China and Russia and not to spend its budget on military too much.

The noted differentiated environment in emerging the Third Offset strategy from two previous ones was how technology has been evolving rapidly in private sector. As Department of Defense of the United States of America noted in National Defense Strategy 2018, new technologies including “advanced computing, big data analytics artificial intelligence, autonomy, robotics, directed energy, hypersonics, and biotechnology” have affected battlefield landscape. Those technologies have been advanced in private sector more than public sector on account of explosive R&D investment of private companies.

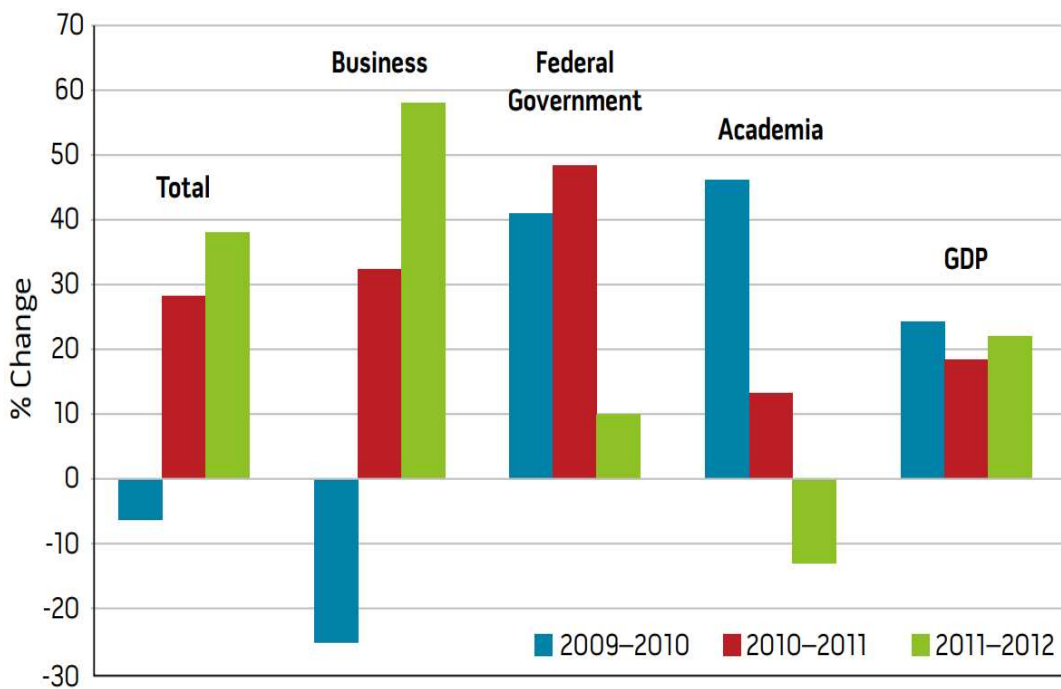
Business sector in the United States of America had enlarged its R&D investment aggressively. Its share of the national R&D spending surged from negative in 2009-2010<sup>11</sup> to over 50% in 2011-2012 following the National

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<sup>11</sup> Business R&D amount in 2009 -2010 had considered shrinking because of a financial crisis in 2008; however, it was recovered in such a short term.

Science Foundation. (Williams and Shaffer, 2015, p 39) In contrast, the federal government’s share of the United States of America in the same period plummeted from 40% to 10%; moreover, academic research, mainly conducting basic research, shrunk from over 40% to negative. (Figure 5)

**Figure 5. Change in U.S. GDP and R&D, by performer in constant 2005 dollars**

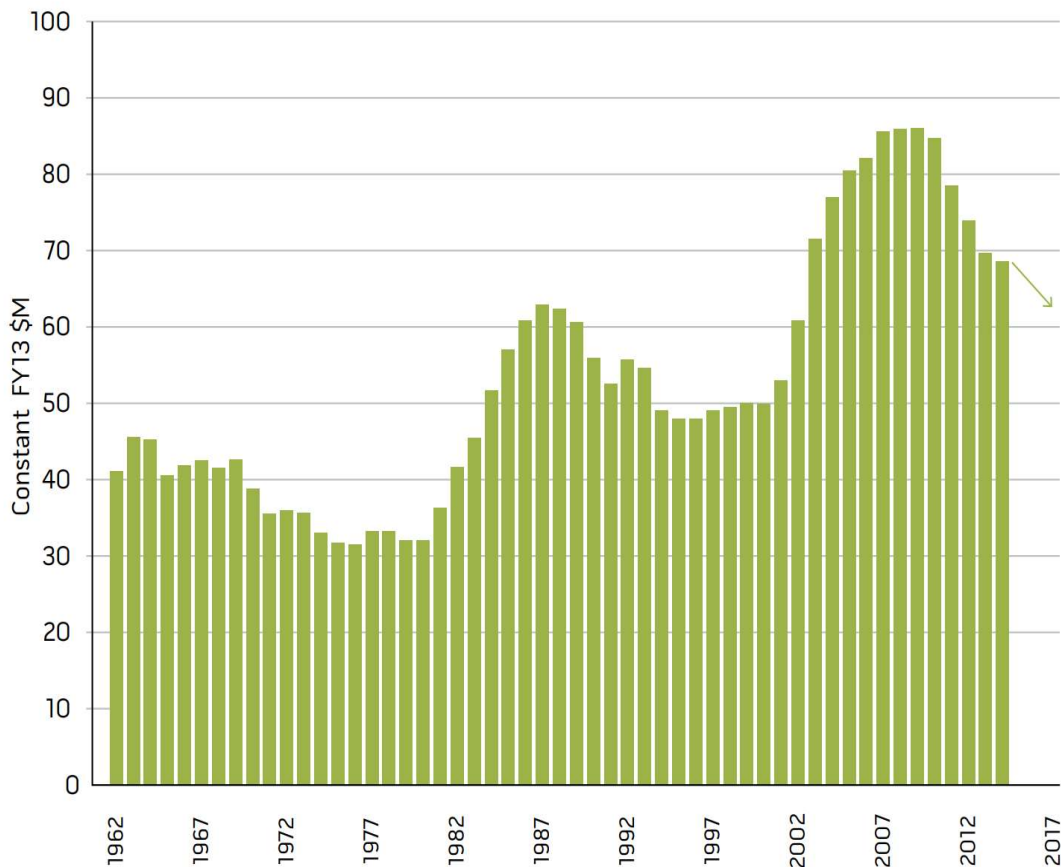


Source: Williams and Shaffer (2015); National Science Board, Science and Engineering Indicators 2014 (Arlington, VA: National Science Foundation, 2014).

Department of Defense budget on RDT&E also decreased gradually after peak in late 2000s. (Figure 6) The phenomenon of R&D budget fluctuation on each sector in late 2000s and early 2010s implies that Department of Defense encouraged its solution “to review industry R&D first and use what industry has

already funded, modified to defense needs as appropriate” and had no luxury to take risk. (Williams and Shaffer, 2015, pp 37-39)

**Figure 6. DOD RDT&E Total Obligational Authority for Fiscal Years 1962 to 2014**



Source: Williams and Shaffer (2015); National Science Board, Science and Engineering Indicators 2014 (Arlington, VA: National Science Foundation, 2014).

To achieve this hard fulfilling mission including contradictory purposes, the former Defense Secretary Chuck Hagel signed on Memorandum of Defense Innovation Initiative, announcing it as the Third Offset Strategy at Reagan



National Defense Forum and on the same day in 2014. He noted in the memorandum that “[We would] identify a third offset strategy that puts the competitive advantage firmly in the hands of American power projection over the coming decades.” In the memorandum, he (2014) also suggested a guideline to focus on for successful implement of the third offset:

... to integrate of leadership development practices with emerging opportunities to re-think how we develop managers and leaders;

... to identify, develop, and field breakthrough technologies and systems that sustain and advance the capability of [the United States of America] military power [through a new long-range research and development planning program];

... [to] reinvigorat[e] wargaming effort [to] develop and test alternative ways of achieving [the United States of America’s] strategic objectives and help [the United States of America] think more clearly about the future security environment;

... [to have] new operational concepts [to] explore how to employ resources to greater strategic effect and deal with emerging threats in more innovative ways; and

... to continue to further examine [the United States of America’s] business practices and find ways to be more efficient and effective through external benchmarking and focused internal reviews.

Chuck Hagel ended up his memorandum with emphasizing that the “innovation and adaptability across [the United States of America’s] defense enterprise” would be the key of “America’s continued strategic dominance” in the 21<sup>st</sup> Century.

At the same time, Deputy Secretary of Defense Robert O. Work who was designated to manage the whole process of the Third Offset was undertaking to actualize the concepts and guideline of it. He launched a new organization and reformed existing parts in Department of Defense to execute his mission effectively and efficiently. His relentless effort contributed to settling the Third Offset strategy for the beginning, and the works has been still going on.

Department of Defense announced five technologies that Third Offset Strategies would mainly focus on in 2015. According to Pellerin (2015), the first one of technologies mainly developed by the Third Offset strategy is artificial intelligence and autonomy, which applied to learning machine. It would aim to invent machine responding rapidly to a cyber attack or an electronic attack or a certain attacks in outer space; furthermore, this technology would be mainly about application of machine that learn and respond itself. The second one is human-machine collaboration. This technology is about machine to help people decide appropriately as well as quickly. It would apply to projectors for pilots of war air craft by collecting and processing quickly a huge amount of data and helping them to decide right. The third one is technology for machine assisted human operations. This technology would assist person’s behavior more easily

and effectively such as wearable electronic devices. Department of Defense predicts that machine assisted human operations would be feasible within the next decade. The fourth technology is for human-machine combat teaming. It would make it possible that one combat team consisting of human and machines including robots operates tactical missions. The fifth was autonomous weapon. Similar to autonomous vehicle, autonomous weapon technology would be applied to each one of the ground maneuver weapons. Besides, air and naval weapon systems would be equipped with autonomous navigating systems as well as autonomous mission operating technologies.

Military modernization led by the Third Offset strategy has been going on as of 2021. It seems too early to evaluate accomplishment of the Third Offset strategy considering that two prior offset strategies took over a decade to be applied to battlefield in practice and evaluated. Meanwhile, the third one has started since less than a decade. Some criticize that the third offset strategy is “a misleading slogan” to “justify increased defense spending” based on false premises:

... [while the third offset initiative is supposed that] declining defense budgets have resulted in a reduction in the number of military people in US armed forces, ... the US defense budget is the largest in the world;

... while the Chinese and Russians are currently upgrading their conventional and nuclear capabilities, they are not upgrading

them more rapidly than the United States, and their current and future capabilities are nowhere close to US capabilities; ... while the number of people on active duty in the US Army and Marines is smaller ..., it is about the same size as it was before the Pentagon got involved in [Iraq and Afghanistan] conflicts; and ... it is hard to see what new investments the Pentagon is making now that it was not making before Hagle's 2014 announcement. (Korb and Evans, 2017, pp 92-95)

On the other hand, however, others keep a positive point of view so far in that it has been "a mechanism of change that would force DoD to start to look at current and future U.S. security problems in a different light." (Gentile et al, 2021, p xi)

In the next part, this research would focus on how the third offset work with private sectors where military would be able to take advantages of advanced technologies in modern society.

### **3. The Third Offset Strategy**

#### **Overview**

There are a lot of factors to be able to affect achievement of innovations. Among them, how to organize and assign resources is considered one of the critical factors in innovation. The former Deputy Secretary of Defense Robert O. Work was one of people who applied the organization theory very well to his innovative mission. He put a weigh on “technology enabled operational and organizational constructs that give [the United States of America] an advantage at the operational level of war, which is the surest way to underwrite conventional deterrence” according to William. (2017) The organizations newly launched or reformed by him was and has been executed their functions. Table 1 shows the organizations and programs that Work, Deputy Secretary of Defense, used for the Third Offset strategy by launching newly or reforming former organizations.

**Table 1. Organizations Associated with the Third Offset**

<b>Organization</b>	<b>Purpose and Activities</b>
Defense Innovation Initiative (DII)	Invest in the development of innovative technologies.
ACDP	Coordinate efforts across DoD to promote the Third Offset and its objectives.
Breakfast Club	Support the efforts of the ACDP by bringing together working-level representatives from across DoD; draft working documents; set the agenda for the ACDP.
DIUx	Offer contracts to tech companies to develop new technologies as needed to fulfill Third Offset goals.
SCO	Repurpose existing technologies to fulfill Third Offset goals.
Cost Assessment and Program Evaluation	Conduct Strategic Portfolio Reviews (SPRs) to support the development of new capabilities.
LRRDPP	Cultivate high-end technologies that might help the United States once more widen its technological lead over potential adversaries.

Source: Rand Corporation, A History of the Third Offset, 2014-2018. (Santa Monica, California: 2021)

### **Advanced Capabilities and Deterrence Panel**

Considering circumstances that technologies in business overwhelmingly advanced more than public, Department of Defense could not help looking for opportunities to make a breakthrough in combining with businesses. Advanced Capabilities and Deterrence Panel, hereinafter “ACDP”, newly launched organization for the Third Offset including “civilians, intelligence community, and the military” according Gentile et al (2021, p 45). ACDP was given “to encourage and coordinate efforts to advance the Third Offset’s broad agenda” as its primary function; “[to push] various DoD and other relevant organizations to

focus on Third Offset-related concerns”; and “to integrate numerous parallel activities that otherwise might not converge.” though the regular meeting quarterly. (Gentile et al, 2021, pp 46-50)

The ACDP worked as a new pathfinder developing some projects such as “special program missile defeat, joint interagency combined space operations center, and the algorithmic warfare cross-functional team” as Gentile et al. (2021, p 46) stated, which were successful and some were not. Regardless its projects, however, the most positive effect of the ACDP was to offer “a starting point to begin think differently about innovation inside [Department of Defense] relative to emerging threats, such as China and its technological innovations over the preceding three decades” (Gentile et al, 2021, p 49) though cooperation among the whole relative organizations and agencies. As Robert O. Work who launched and participated in the ACDP himself mentioned in the interview with Pellerin (2017), he was able to seek with the ACDP for “a partnership between a number of interested agencies whose work overlaps in the areas of policy, operations, and intelligence, and would assist in defining and managing the different interests and capabilities that might be potentially useful for a Third Offset strategy.” Grant who has experienced working on the Third Offset strategy described the importance of the ACDP as lumping “senior [Department of Defense] leadership to get them to focus on specific problems that they now face” in the interview in 2019.<sup>12</sup> (Gentile et al. 2021, p 45)

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<sup>12</sup> Grant, G. had an interviewed with RAND Corporation researchers about Grant’s experiences while working on the Third Offset, telephone, September 27, 2019.

On the other hand, the ACDP operated productively with full support from the Breakfast Club, the working group “bringing together working-level representatives of mostly the same organizations represented by the ACDP” according to Gentile et al. (2021, p 49) They had regular meetings in the morning twice a month to “coordinate the resulting products, work through drafts, and help figure out what the next ACDP meeting agenda should be.” (Gentile et al. 2021, p 51) Thanks to a role of the Breakfast Group as “a venue for sharing information and ideas rather than action group” as Gentile et al. described, the ACDP enabled to lead the Third Offset Strategy overcoming its ambiguity for the beginning.

### **Defense Innovation Unit**

Defense Innovation Unit – Experimental, hereinafter DIUx, newly organized for the Third Offset strategy, was the outstanding signature organization for the Third Offset strategy in that it not only created a new model but also stimulated to think differently with regards to solving problems by collaborating with business. In the circumstance that Department of Defense should work with private sector having cutting edge technologies, DIUx succeeded to find a way to persuade business people to work with public sector.

DIUx was established in 2015 as an outreach team of the Department of Defense in Silicon Valley. In 2016, it expanded its offices to Boston, Massachusetts, and Austin, Texas to broaden not only networks with companies



but also opportunities to seek for applying new technology in battlefields according to DIU. As of 2019, DIUx were running with 65 staff and a budget of 44 million dollars.

Its mission was to “[work] at the speed of business to attract innovators and bring cutting edge technologies to the warfighters ... [by leveraging] commercial technology investment” according to announcement of Department of Defense for the beginning, and currently DIU, becoming a permanent organization in 2018, defines its aim as “[to strengthen the United States’ national security by accelerating the adoption of leading commercial technology throughout the military and growing national security innovation base.” (DIU, n.d.)

According to Gentile et al. (2021), leaders of the Third Offset strategy noticed that Silicon Valley had new technologies to enhance military forces; meanwhile they had no interest in working with military without benefit. DIUx focused on setting up a new business model in which profit-oriented private companies and non-profit public sector were able to cooperate. DIUx reformed, mostly created, its work processes as well as characteristics of organization, and one of their most outstanding reforms at their early days was shortening the period for contracts in 30 to 60 days by specifying requirements. Besides, it concentrated on hiring “operators who understood Silicon Valley’s operation and could vet technologies” by creating a working environment similar to Silicon Valley so private sector people feel homogeneity and empathy with DIUx.

(Gentile et al., p 55)<sup>13</sup>

In addition to that, Gentile et al. (2021) put an emphasized on processes to attract Silicon Valley to military that:

first[ly] ... DIUx was not asking for a piece of the company in which it invested;

second[ly], DIUx could offer “fast-tracked patent review” through the U.S. Patent and Trademark Office if the technology met an acute national security need;

third[ly], DIUx offered the ability to introduce firms to “tier-1 defense companies,” which could pay top dollars to license the technology or perhaps buy the firms outright;

[lastly], DoD offered access to a panoply of virtual and actual test ranges.

DIU built a new project lifecycle to respond the needs of both Joint Force and private companies: the former wanted to apply new weapon systems in practice as soon as possible and the latter was likely to confirm the contract quickly whether it would be signed or not, to transit to another business quickly even if the contract is not concluded. Considering that, DIU clarifies 4 phases of the project process (Figure 7):

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<sup>13</sup> Holliday M. was interviewed by RAND Corporation researchers about the Third Offset and DIUx, August 23, 2019.

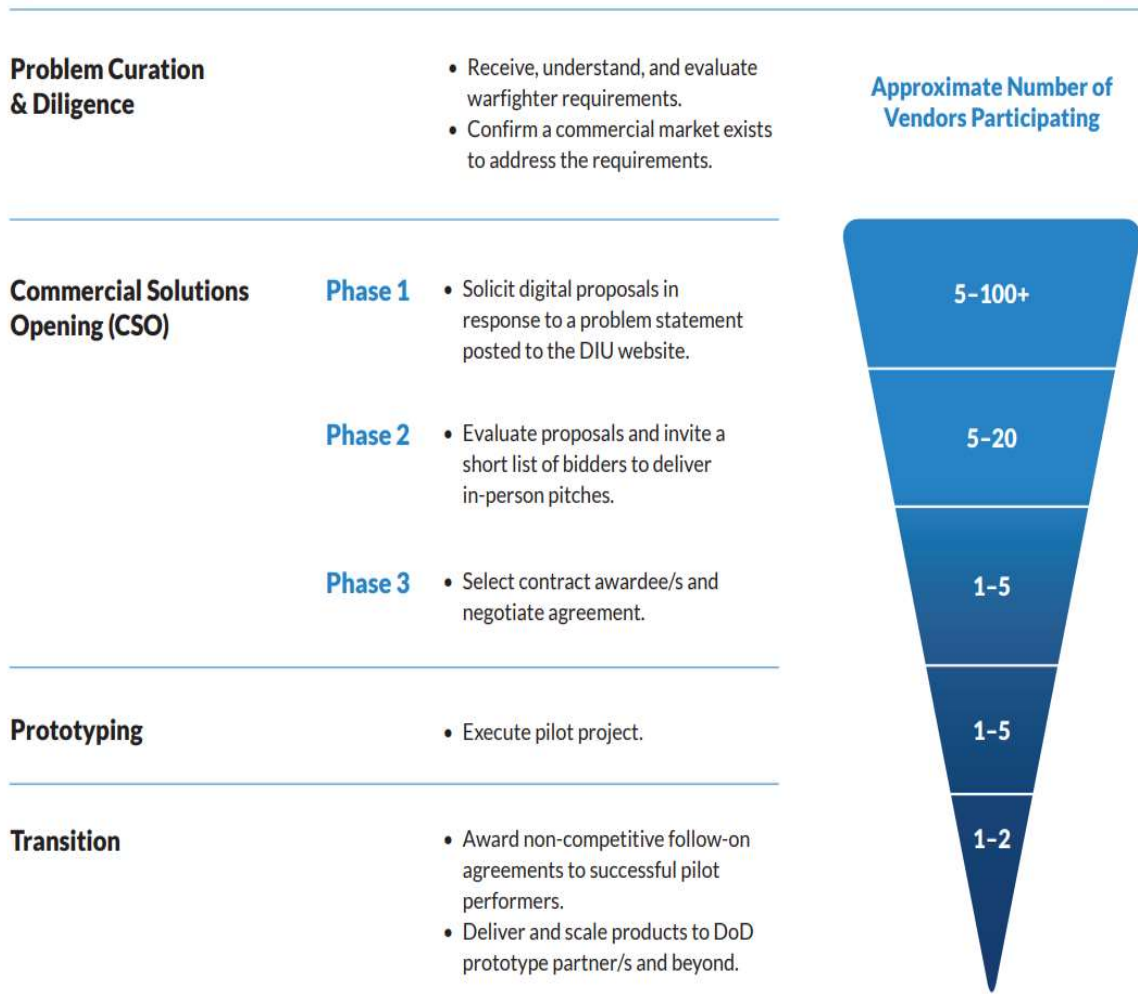
[Stage 1] Problem Curation and Diligence. [DIU] receive[s], understand[s], and evaluate[s] warfighter requirements. [Then, it] confirm[s] a commercial market exists to address the requirements;

[Stage 2] Commercial Solutions Opening. [DIU] solicits digital proposals in response to a problem statement posted to [its] website. In this phase, 5 to 100 vendors would participate. [DIU] evaluates proposals and invites a short list of bidders[, usually 5 to 20,] to deliver in-person pitches. [Then, it] selects contract awardee/s, the number of 1 to 5, and negotiates agreement.

[Stage 3] Prototyping. [DIU] executes pilot project.

[Stage 4] Transition. [DIU] awards non-competition follow-on agreements to successful pilot performances[, of the number of 1-2 vendors, and] delivers and scales products of DoD prototype partner/s and beyond. (Defense Innovation Unit, 2021, p 7)

**Figure 7. DIU Project Lifecycle**



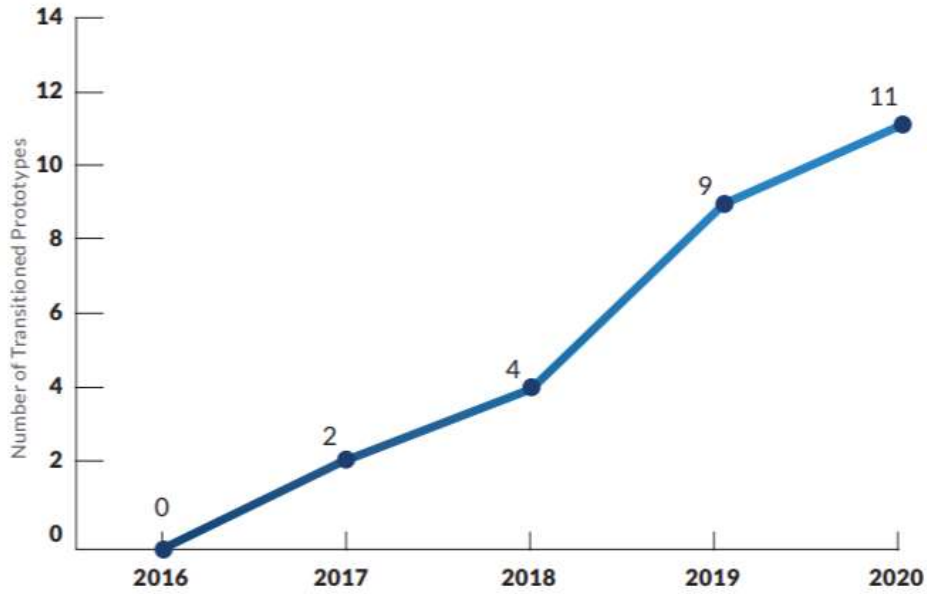
Source. Defense Innovation Unit. (2021) Annual Report 2020.

Its goal is taking 60 to 90 days to prototype operational test contract award from solicitation closure. As of 2020, its average days for that have been recorded 149. This record still has a room to shorten according to DIU. (2021, p 7) However, it absolutely makes the time from soliciting to awarding shorten compared to the process of research and development led directly by military or public sectors.

Performance of DIU for five years from 2016 to 2020 is also noteworthy following the Annual Report 2020 by DIU. (2021) DIU has received and reviewed 2,381 commercial proposals. Among those proposals, 208 prototyped operational test contracts awarded to commercial companies and 95 prototype projects initiated to solve Department of Defense challenges. In addition to that, it has shown the effect of 11.7 billion dollars in private investment leveraged economically. Also, the number of transitioned prototyped has increased gradually from 2017, so it has been reached to 11 in 2020. (Figure 8)

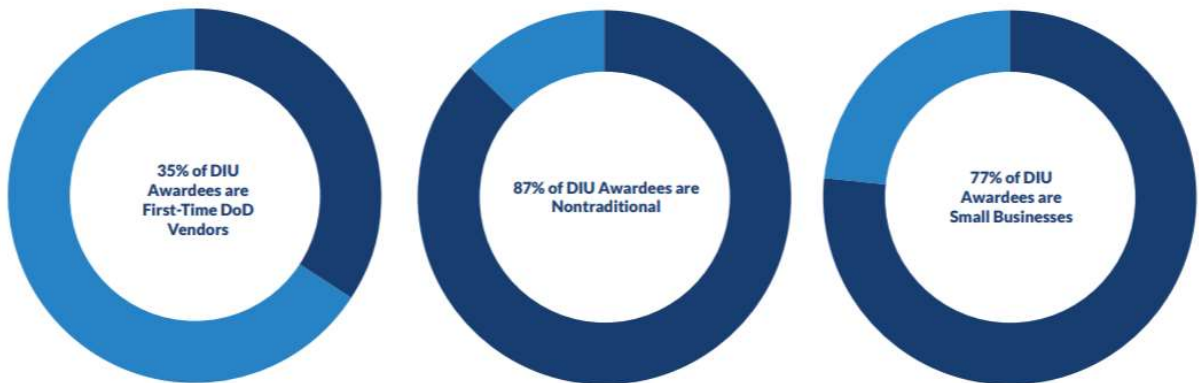
Moreover, the way DIU works provides the opportunities for small businesses and non military experienced companies to participate in national security. DIU states in the Annual Report 2020 that 87% companies of awardees are nontraditional, and 35% of awardees are first-time Department of Defense vendors. Also, it shows that 77% of its awardees are small businesses though DIU works “with traditional defense contractors and large businesses” either as Figure 9 showed.

**Figure 8. Transitioned Prototypes 2016-2020**



Source: Defense Innovation Unit. (2021) Annual Report 2020.

**Figure 9. Contract Award Recipients by Business Type**



Source. Defense Innovation Unit. (2021) Annual Report 2020.

DIU's work also facilitates international cooperation within allies. It gives the opportunities for companies based on foreign countries to participate in submitting proposal. As of 2020, DIU has awarded contract agreements to companies from Canada, France, Israel, New Zealand, Spain, and the United Kingdom according to DIU. (2021, p 9)

DIU has been evaluated as successful organization in that it creates the system through which technologies in private flew into military and national security. However, it would not be all. The real value of DIU is that it inspires the way to think differently regarding to how to develop technologies as Gentile et al. mentioned (2021, p 57) Department of Defense learned through the process DIU works how to “interact with new supplies” as well as “speed and the ability of Department of Defense to absorb all to the new innovations coming from Silicon Valley and elsewhere.”<sup>14</sup>

### **Strategic Capability Office**

Strategic Capability Office, hereinafter “SCO”, was an already existed organizations, which was newly given its mission for the Third Offset strategy. The role of SCO in Third Offset strategy was completely opposite to DIUx. Its task in the new strategy was to figure out how to reuse current technologies

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<sup>14</sup> Shah, R. had a telephone interview with RAND Corporation researchers about the Third Offset, June 12, 2019.

(Gentile et al. 2021, p 58); similarly, Department of Defense (n.d.) has stated “to develop new and innovative ways to shape and counter emerging threats across all domains, bringing unexpected and game-changing capabilities to the Joint Force.” Specifically, its mission was “to look for relatively quick and inexpensive solutions by finding new ways to use extant technology”, as Pellerin (Gentile et al., 2021, p 59; 2016) throughout three approaches:

- (1) taking something designed for one mission and making it do a completely different mission;
- (2) integrating discrete systems into broader, integrated systems that could do something that the component systems could not do on their own; and
- (3) altering a capability by adding commercial technology.

The mission of SCO was meaningful for defense budget. Some of SCO’s projects were evaluated successfully to “make old weapon do new tricks for a minimum added cost,” according to Freedberg Jr., (2016) such as arsenal plane fully linked to fifth-generation aircraft, flying and underwater swarming micro drones and hypervelocity projectiles fired by already existed artillery, and the transformation of the SM-6 surface-to-air missile into an anti-ship missile. (Gentile et al. 2021, p 59) Considered its performances, SCO has been a permanent organization in 2016 and moved from Under Secretary of Defense for Research and Engineering to Deputy Secretary of Defense in 2020 to “[establish] a cross-functional team to improve the efficiency and effectiveness” according to



Hitchens. (2019)

The role of SCO might not seem to be innovative so much compared to one of DIUx or LRRDP in one hand. Considering the circumstance of budget restriction, however, SCO tried to lead the best result without pouring budget as well as with high rate of successful innovations by thinking upside down about every technologies existing.

### **Long-Range Research and Development Plan**

Long range research and development plan, hereinafter “LRRDP”, is one of the core programs in the Third Offset strategy, succeeding LRRDPP in Second Offset. It started with the declaration of Secretary of Defense Chuck Hagel in the memorandum of Defense Innovation Initiative in 2014. He announced the revival of the program stating that “a new long-range research and development planning program will identify, develop, and field breakthrough technologies and systems that sustain and advance the capability of U.S. military power.”

As one of the efforts for Defense Innovation Initiative, the former Under Secretary of Defense Frank Kendall undertook to reify a new LRRDPP, LRRDP. He clarified the direction of LRRDP in the memorandum in 2014:

The LRRDP shall identify high-payoff enabling technology investments that could provide an opportunity to shape key future

US material investments, offer opportunities to shape the trajectory of future competition for technical superiority, and will focus on technology that can be moved into development programs within the next five years.

Although LRRDPP had succeeded as a government led research and development programs in past, he emphasized the cooperation with outside of the government considering current technology development environment. He also stated in his memorandum in 2014, recognizing initiative change of technology-based innovation from the government to businesses, that “[t]he LRRDP will solicit inputs from across industry and academia. LRRDP working groups will assess these inputs and consult with experts inside and outside government to identify technology opportunities that offer strategic advantage.”

Now, according to Department of Defense, LRRDP has been positioned as a program that

help[s Department of Defense] better understand and prioritize new or unconventional applications of technology to help provide the United States with significant military technological advantage into the future; seeks to identify system concepts that will have significant impact in the 2025-2030 time frame, and to identify the steps the department should be taking today to nurture the technology development required to make those system

concepts a reality. (Defense Innovation Marketplace, n.d.)

The importance of LRRDP is in that it provides the opportunities for military to imagine and conceptualize future battlefield considering technologies and to figure out which technology and weapon systems would be the most effective for sustaining dominance of U.S. in national security. In LRRDP, participants are able to be off the limits of the current technology level or battlefield strategies because the one of the main goals of LRRDP is to offer insight and inspiration for future battlefield and security landscape. Considering that, Department of Defense has been looking for “what[ever] systems, capabilities, and architectures could the Department [of Defense] field post-2025 that will ensure [the United States of America’s] dominance and shape the future of military technical competition” in the broad fields such as air, missile and precision guided munition defense, air superiority, space, undersea and emerging technologies as described in Defense Innovation Marketplace. (n.d.)

### **Cost Assessment and Program Evaluation**

Cost Assessment and Program Evaluation, hereinafter “CAPE”, is also one of the organizations that support the Third Offset strategy. CAPE was established in 1961 as an advisor for Defense Secretary, and it has provided cost assessment and program evaluations which has been studied independently about all areas that Secretary, Deputy Secretary or Directors of Defense would need to be advised including military capabilities and institutional issues.

The former Deputy Secretary R. Work, however, asked CAPE to focus more on building new capabilities of military. Considering that, CAPE (n.d.) stated its mission on its website as “[to] provide the Department of Defense with timely, insightful and unbiased analysis on resource allocation and cost estimation problems to deliver to optimum portfolio of military capabilities through efficient and effective use of each tax payer dollars.” Specifically, it describes its goal as:

[to] ensure discipline in the PPBE process to support development of a balance portfolio of defense capabilities to provide the best defense for the nation,

[to] develop a broad range of well-thought out capability and program alternatives that enable the secretary and other civilian and military leaders of Department [of Defense] to make decisions that improve our nation’s defense,

[to] provide ever deeper insight into the costs of major acquisition programs that enables responsible budgeting and proactive management decisions so that the Department [of Defense] can control cost achieve savings, and

[to] build the skills of the Department’s analytical workforce to continue to advance the frontiers of systems analysis and answer tough questions for generations to come. (CAPE, n.d.)

Under the mission and goals, CAPE (n.d.) has gathered its capacity to “provide analytic advice on alternative weapon systems” and “force structures as well as support modernization capabilities in the air, maritime, and land domains to enhance lethality.” Especially, the main goal of CAPE regarding the Third Offset strategy was “to present programmatic options, [for example,] clear choices to make with respect to investing in specific technologies or acquiring certain systems” according to Gentile et al. 2021, p 62). Gentile et al (2021) also mentioned, it endeavored to

make the force more capable, especially, but not exclusively, with regard to countering A2/AD [(Anti Access and Anti Denial)] or finding ways to create no-man’s lands ... doing with “connecting grids,” or bridging sensors with capabilities across different domains.

One of CAPE focused on was war gaming. Work (2015), the former Deputy Secretary of Defense, considered war games as one of the most useful tool to develop “abilities to test concepts, capabilities, and plans using simulation and other techniques ... atrophied” as described in his memo “War gaming and Innovation”. Main reasons that the Third Offset put a value on war gaming are “(a) finding the means to enable the larger community to benefit from them and (b) shaping them to better respond to the needs of the Third Offset” following Gentile et al. (2021)

According to Gentile et al., (2021, pp 62-64) Work, the former Deputy Secretary of Defense, also set the operating model for war gaming. First of all, he launched an organization called a “Defense War gaming Alignment Group,” and it was run by four “Quad Chairs”: the Office of the Under Secretary of Defense for Policy, CAPE, the Office of Net Assessment<sup>15</sup>, hereinafter ONA, and the Joint Staff. Quad Chairs decided which proposal would be worthy to be funded from war game incentive funds each quarter. Secondly, Work (2015) categorized the scope of weapons by effort or time horizons weapons requiring into action and organizations mainly holding responsibility for their war gaming:

[(a) Near term: The near term effort would take 0 to 5 years.] [It] would “focus on the execution and improvement of current operational plans and the reinvigoration of Joint combined-arms expertise.” Combatant commands, the services, the Joint Staff, and the Office of the Under Secretary of Defense for Policy led it.

[(b) Middle term: The middle term effort is about the weapons to take 5-15 years to put into practice.] [It] would focus on “the development of new capabilities as well as operational and organizational concepts ... with an eye toward incorporating

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<sup>15</sup> Office of Net Assessment, established in 1973, is the organization in Department of Defense that provides long-term comparative assessments of trends, key competitions, risks, opportunities, and future prospects of U.S. military capability to the Secretary of Defense and Deputy Secretary of Defense. The entire scope and nature of its research is not disclosed publicly. Retrieved from <https://www.defense.gov/About/Office-of-the-Secretary-of-Defense/Office-of-Net-Assessment/>

innovative approaches or technologies into the future force and identifying potential portfolio offsets.” This effort would be led by the Joint Staff, “with significant participation from Policy, [CAPE], [Combatant commands], and the Military Departments.” [(c) Far term: The far term effort would be beyond 15 years.] [T]he idea was to “assess the operational impacts of technology trends, future challenges, and military competitions.” This effort would be led by ONA. (Gentile et al., 2021, pp 64-65)

## **Conclusion**

The Third Offset strategy is still going on even though it does not seem to get attention as much as when it appeared for the first time. After changing the administration and leader of Department of Defense, however, the innovation in military based on technology and cooperation with private sector has kept proceeding as of 2020s.

The critical concepts of the Third Offset strategy has seceded regardless the regime. In 2018 was published National Defense Strategy in Trump Administration. National Defense Strategy 2018 shows the similar lines with the Third Offset strategy, being able to be considered as an example of the fruitful affection of the Third Offset Strategy according to Gentile et al. (2021) National Defense Strategy admits that the “rapid technology advancements” is the key factors regarding that military should be changed and look for a new operation

concept to sustain the dominance of the United States in the area of national security. In addition to that, National Defense Strategy highlights artificial intelligence and autonomy as the most developing required technologies. It also makes a point of the significant role of private sector in driving innovation.

Moreover, the Third Offset strategy led the military to a new procedure how to solve problems and who to work with. It opened the military to the public, which was considered classified for a long time, and allowed to cooperate as much as possible with business. Throughout the time passing, the Third Offset strategy has been positioned as “a new method to get new capabilities that would allow new strategies to be built” rather than just a strategy to adopt new technology into military. (Gentile et al. 2021)



## **4. Cooperation with Business**

### **Overall of R&D Policy**

#### **Change of the landscapes**

As a result of the Second Offset strategy, the United States of America military kept the strategy to maintain its dominant capability with a few high technology weapon systems such as satellites, equipped aircraft carrier, and more accurate air missiles. However, the threats inside as well as outside the country did their best effort to disable those weapons of the United States of America.

As technology has been developed rapidly in the private sector, it has flowed into the military of any countries or entities which may become a threat to national security to one country. In other words, the technology, in one hand, becomes a good method to innovate a nation's military tactics, sometimes even its operational concepts; on the other hand, it changes the enemy itself or national security landscape that a nation has to respond for.

For example, China and Russia has followed up the capabilities of the United States of America's military during she was focusing on the wars against the terrorisms and in the Middle East. In addition, entities of terrorism have developed and equipped high technology weapons. These phenomena led the United States Forces to work together with the private sector. The Third Offset

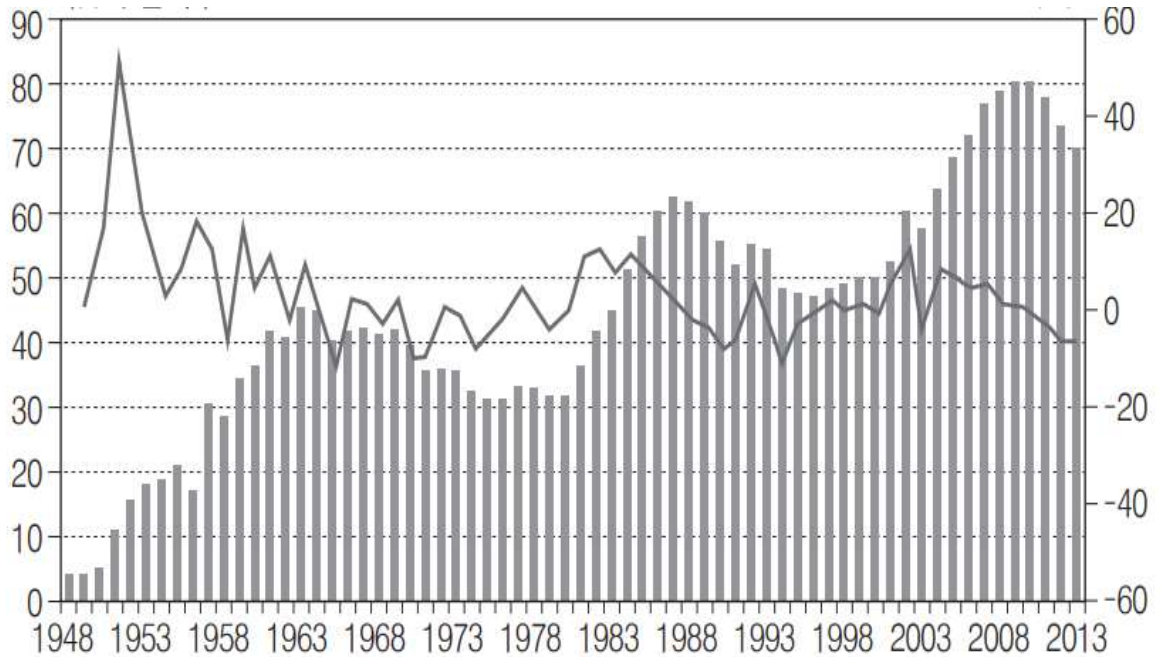
strategy is the very trigger that forced military to cooperate with business.

## **Investment**

The United States of America has been focusing on high cutting edge technology research and development for sustaining its superior status of the world's strongest military forces. As a result, the investment in military R&D has brought the progress and structural advancement of the United States of America's defense industry.

The United States of America has been invested the most amount of budget on defense industry in the world. The scale of R&D investment in defense industry has steadily increased between the middle of 1990 and 2007. After 2008, however, R&D investment has decreased because of defense budget reduction affected by the financial crisis in 2008. (Figure 10)

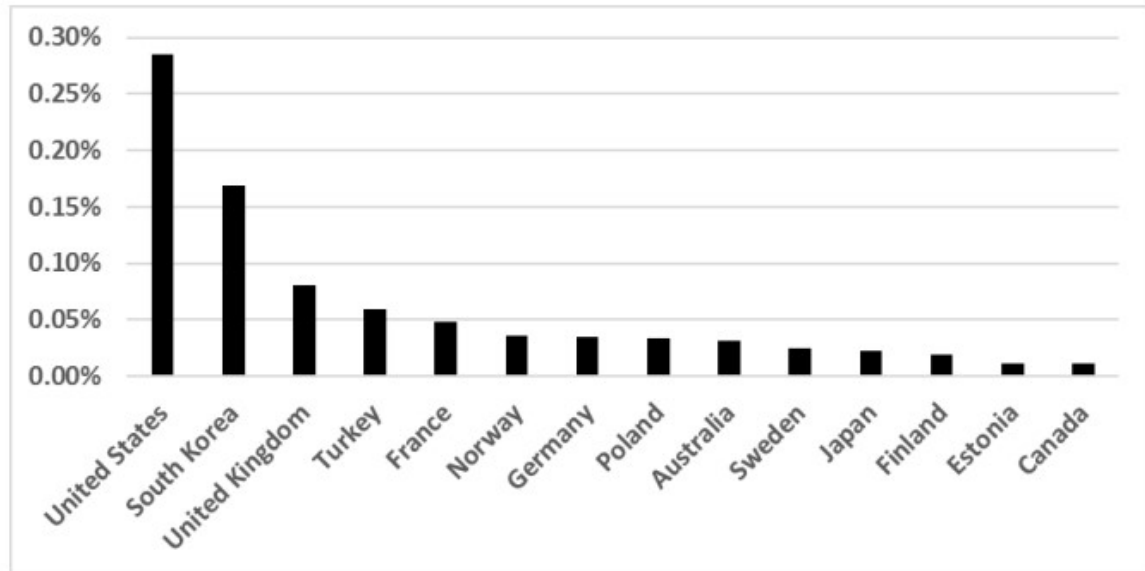
**Figure 10. Trend of Defense R&D Budget (1948-2012)**



Source: Jang et al. (2014). Changes and Implications of Major Countries' Defense Industry Development Policies. Korea Institute for Industrial Economics and Trade. p 118.

The government defense R&D funding as a share of GDP, however, was 0.3 percent, the highest proportion in the OECD countries; the share of government R&D funding spent on defense R&D was over 40% in 2017. (Figure 11, Congressional Research Service, 2020)

**Figure 11. OECD Countries with the Highest Levels of Government Defense R&D Funding as a Share of GDP, 2017**

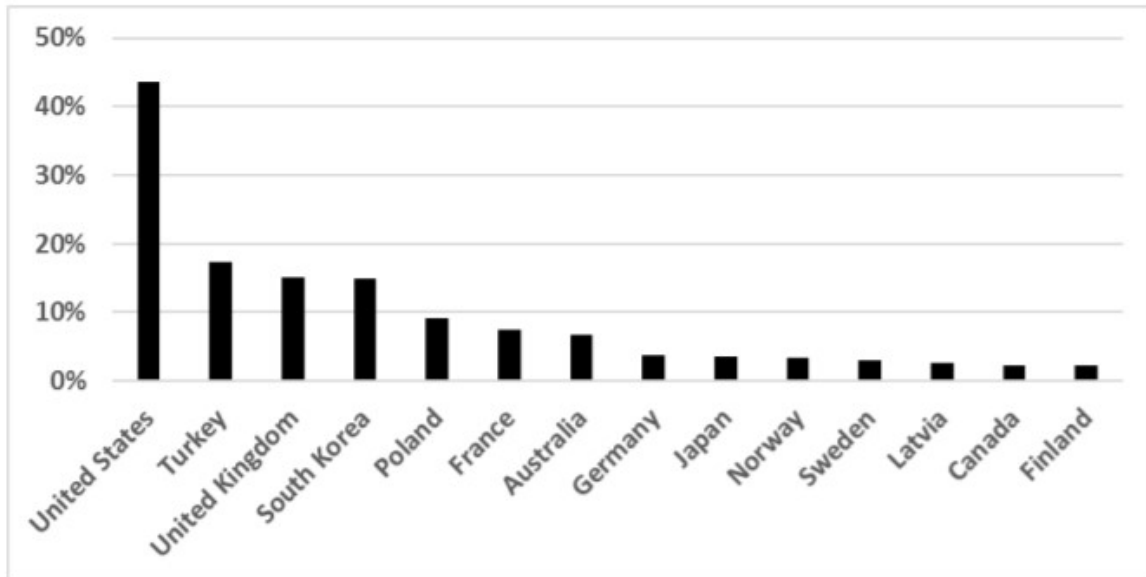


Source: Congressional Research Service. (2020) Government Expenditures on Defense Research and Development by the United States and Other OECD Countries: Fact Sheet.; CRS analysis of OECD RDS Database data

Note: Does not include countries with less than 0.01% government defense R&D as a share of GDP. Data for Canada are for 2016.

The government defense R&D funding as a share of GDP, however, was 0.3 percent, the highest proportion in the OECD countries; the share of government R&D funding spent on defense R&D was over 40% in 2017. (Figure 12, Congressional Research Service, 2020)

**Figure 12. OECD Countries with the Highest Levels of Government Defense R&D Funding as a Percentage of Total Government R&D Funding, 2017**



Source: Congressional Research Service. (2020) Government Expenditures on Defense Research and Development by the United States and Other OECD Countries: Fact Sheet.; CRS analysis of OECD RDS Database data

**Note:** Does not include countries that spent less than 2.0% of total government R&D on defense R&D. Data for Canada and Latvia are for 2016; government defense R&D not available for Israel.

However, as the United States of America's recovering from the financial crisis, the budget of research, development, testing and evaluation (RDT&D) has been increased steadily. In the fiscal year of .2021, Department of Defense requested 106.6 billion dollars for RDT&D which was the largest amount of budget ever. Department of Defense planned to allocate the budget mainly for hypersonic capabilities, micro-electronics, autonomous systems and artificial

intelligence in which Pentagon would pour their efforts to establish and maintain military advantage (International Institute for Strategic Studies, 2021, pp 40-41). For the fiscal year of 2022, Department of Defense announced that it has been requesting 112 billion dollars, which is a 5.1 % increase over fiscal 2021.<sup>16</sup> Deputy Secretary of Defense Kathleen H. Hicks briefed that Department of Defense would “fund advanced technologies like microelectronics, hypersonic missiles, artificial intelligence, cyberspace capabilities and a 5G network, offering highlights in budget request:

- (a) \$20.4 billion for missile defense
- (b) \$6.6 billion to develop and field long-range fires
- (c) \$52.4 billion for fourth- and fifth-generation fighter aircraft
- (d) \$34.6 billion for a hybrid fleet of manned and unmanned naval platforms
- (e) \$12.3 billion for ground force weapons and next generation combat vehicles
- (f) \$20.6 billion for space capabilities
- (g) 10.4 billion for cyberspace activities
- (h) \$122.1 billion for training, installation support, and support to

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<sup>16</sup> Department of Defense. (2021). DOD Budget Request Boosts Research, Nuclear Modernization and Includes 2.7% Pay Raise. Retrieved from <https://www.defense.gov/News/News-Stories/Article/Article/2639101/dod-budget-request-boosts-research-nuclear-modernization-and-includes-27-pay-ra/>

allies and partners<sup>17</sup>

## **Organization for R&D**

Department of Defense has the largest amount of R&D fund among federal departments and agencies of the United States of America. Also, technology has played a huge role to sustain dominance of the United States of America in national security. For these reasons, the organization in Department of Defense in charge of RDT&E has been recognized for its importance for decades.

During the Second Offset strategy, from 1977 to 1986, was the Under Secretary of Defense for Research and Engineering in Pentagon. In 2016, then, Department of Defense eliminated the position of the Under Secretary of Defense for Acquisition, Technology, and Logistics, and established the positions of the Under Secretary of Defense for Research and Engineering and for Acquisition and Sustainment through the National Defense Authorization Act for Fiscal Year 2017 according to Congressional Research Service (2021). The office of the Under Secretary of Defense was expected to “take risks, press the technology envelop, test and experiment, and have the latitude to fail, as appropriate.” (Congressional Research Service, 2021; Conference Report (H. Rept. 114-840) for the FY 2017 NDAA ) Regarding to reestablish the office of the Under

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<sup>17</sup> Ibid

Secretary of Defense, the Congressional Research Service (2021) cited the statement of the Senate Armed Services Committee in S. Rept. 114-255

The committee expects that just as previous USE (R&E) incumbents led the so-called “Second Offset” strategy, which successfully enabled the United States to leap ahead of the Soviet Union in terms of military technology, the new USD (R&E) would be tasked with driving the key technologies that must encompass what defense leaders are now calling a “Third Offset” strategy: cyber and space capabilities, unmanned systems, direct energy, undersea warfare, hypersonics, and robotics, among others.

The Under Secretary of Defense for Research and Engineering has its authority and duties on:

- (a) serving as the chief of technology officer of DOD with the mission of advancing technology and innovation for the military services and DOD,
- (b) establishing policies on, and supervising all defense research and engineering, technology development, technology transition, appropriate prototyping activities and programs, and unifying defense research and engineering efforts across DOD; and
- (c) serving as the principal advisor to the Secretary of Defense on



all research, engineering, and technology development activities and programs in DOD. (Congressional Research Service, 2021)

In other words, the Under Secretary of Defense for Research and Engineering takes responsibilities on “managing the [Department of Defense] science and technology portfolio to address near-term and far-term capability gaps between emerging threats and ensuring that [Department of Defense] technical infrastructure, scientific and engineering capabilities, and associated resources align with [Department of Defense] priorities” according to Congressional Research Service (2021).

Based on its powers and duties, the Office of the Under Secretary of Defense organized its sub structure around three major components following the Congressional Research Service (2021):

(a) A Strategic Intelligence Analysis Cell focused on understanding the capabilities and vulnerabilities of potential adversaries, assessing U.S. capabilities, tracking global technology trends, assessing emerging threats, and identifying potential opportunities that warrant action and merit investment.

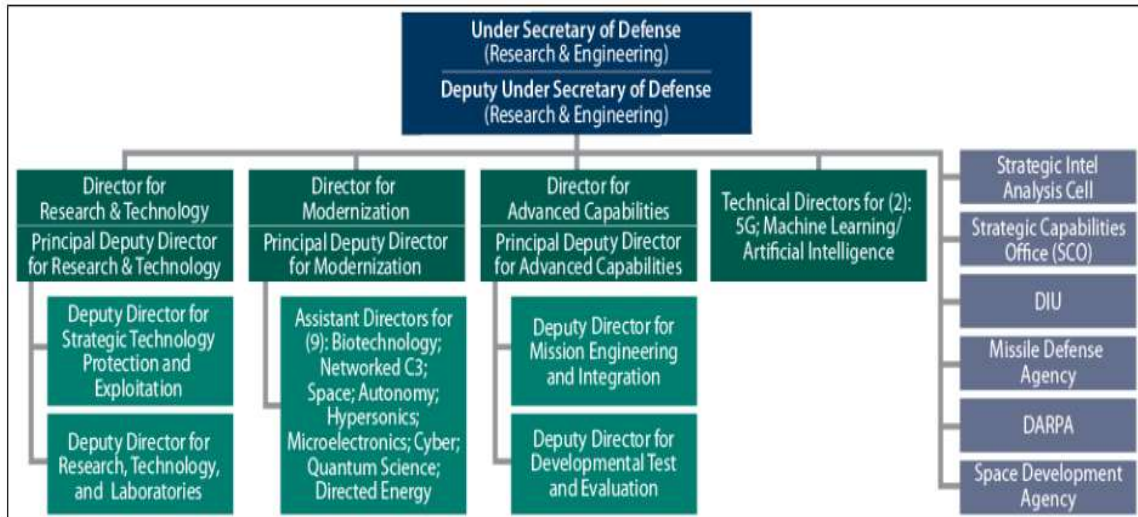
(b) An Assistance Secretary Defense (ASD) for Research and Technology responsible for setting the strategic technical direction and investment strategy for Department of Defense to

ensure technical dominance on the battlefield, integrating Department of Defense's laboratory infrastructure, and providing stewardship of the technical community that conducts defense research.

(c) An ASD for Advanced Capabilities responsible for prototyping and experimentation that is designed to increase understanding of a technology and its capabilities, drive down technical risk, and incorporate warfighter feedback to ensure concepts that transition to acquisition address the needed capability, and are timely and affordable.

According to Congressional Research Service (2021), three sub organizations were approved with replacing the Assistance Secretary of Defense to the Director of Defense in 2018. In addition to that, significant organizations to pursue the Third Offset strategy including DARPA, Strategic Capabilities office, and DIU were also structured to report directly to the Under Secretary of Defense for Research and Engineering. In 2019, the Space Development Agency was created under the Office of the Under Secretary of Defense for Research and Engineering to accelerate the development and field of new military space capabilities. Furthermore, a director for modernization was created under the Office of the Under Secretary of Defense to take responsible for overseeing research and technical areas deemed critical to maintaining the advantage of the U.S. military; an assistant or technical director leads each of the priority areas. (Figure 13)

**Figure 13. Organizational Chart for Office of USD (R&E)**



Source: Congressional Research Service. (2021) Defense Primer: Under Secretary of Defense for Research and Engineering.; Adapted from Attachment 1, Department of Defense, Memorandum from Deputy Secretary of Defense on Establishment of the Office of USD (R&E) and the Office of the USD (A&S), 2018; and <https://www.cto.mil/leadership/>, accessed on January 30, 2020.

Regarding to the relationship between the Under Secretary of Defense for Research and Engineering and the one for Acquisition and Sustainment, there were expectations as well as concerns as Congressional Research Service (2021) described. They were expected to be “close and cooperative as critical for the efficient and effective delivery of advanced technologies to the warfighter, especially at the fast pace many expect is needed maintain the U.S. technological lead over potential adversaries”; in contrast, they were also concerned that “dividing the roles and responsibilities of the Under Secretary of Defense for

Acquisition, Technology, and Logistics into and the Under Secretary of Defense for Research and Engineers and the one for Acquisition and Sustainment might cause “barriers or challenges [to bring] a new technology from the research laboratory to full scale deployment in the armed forces”. However, in the conference for the FY 2017 NDAA were asserted that “elevating the missions of advancing technology and innovation within DOD, fostering distinct technology and acquisition cultures to better deliver superior capabilities, and providing greater oversight and management of DOD components outside the military services would best be addressed by the creation of two undersecretaries; ...[and] any potential barriers or gaps could “be mitigated through effective leadership and management[,” with] requiring the [Under Secretary of Defense for Research and Engineering] to advise the [Under Secretary of Defense for Acquisition and Sustainment on materiel development, milestone, and production decisions.” (Congressional Research Service, 2021)

### **The Gate for Cooperation: Defense Innovation Marketplace**

As mentioned in prior chapters, Department of Defense recognized that the private sector has advanced in high technology and the military needed to work together with business in a bundle of documents related to the Third Offset strategy. This acknowledgement put the United States military into the action through various ways including launching DIUx. To increase efficiency of cooperation with private sectors, Department of Defense opened a portal to integrate all the projects in which business would be able to participate in

national security, called Defense Innovation Marketplace.

Defense Innovation Marketplace is, in brief, an online gateway to communicate with industry and the Department of Defense regarding science and technology. It started as a method of the Better Buying Power<sup>18</sup> 1.0 Initiative to improve independent research and development effectiveness with industry and government. (Defense Innovation Market, n.d.) Defense Innovation Marketplace gathers and discloses all the information about projects concerning defense and national security in short term and long terms, even projects having possibility to executing in future. This disclosed information brings to business less effort and cost for acquiring information, and, moreover, stimulates fusion and link between research areas as well as cooperation between public and private entities.

To achieve these goals, the government shares the directions and information about military technology predicting the need in future, which helps businesses to plan new projects. Likewise, businesses share their projects that are currently going on as well as are predicting having the value in future, so will be

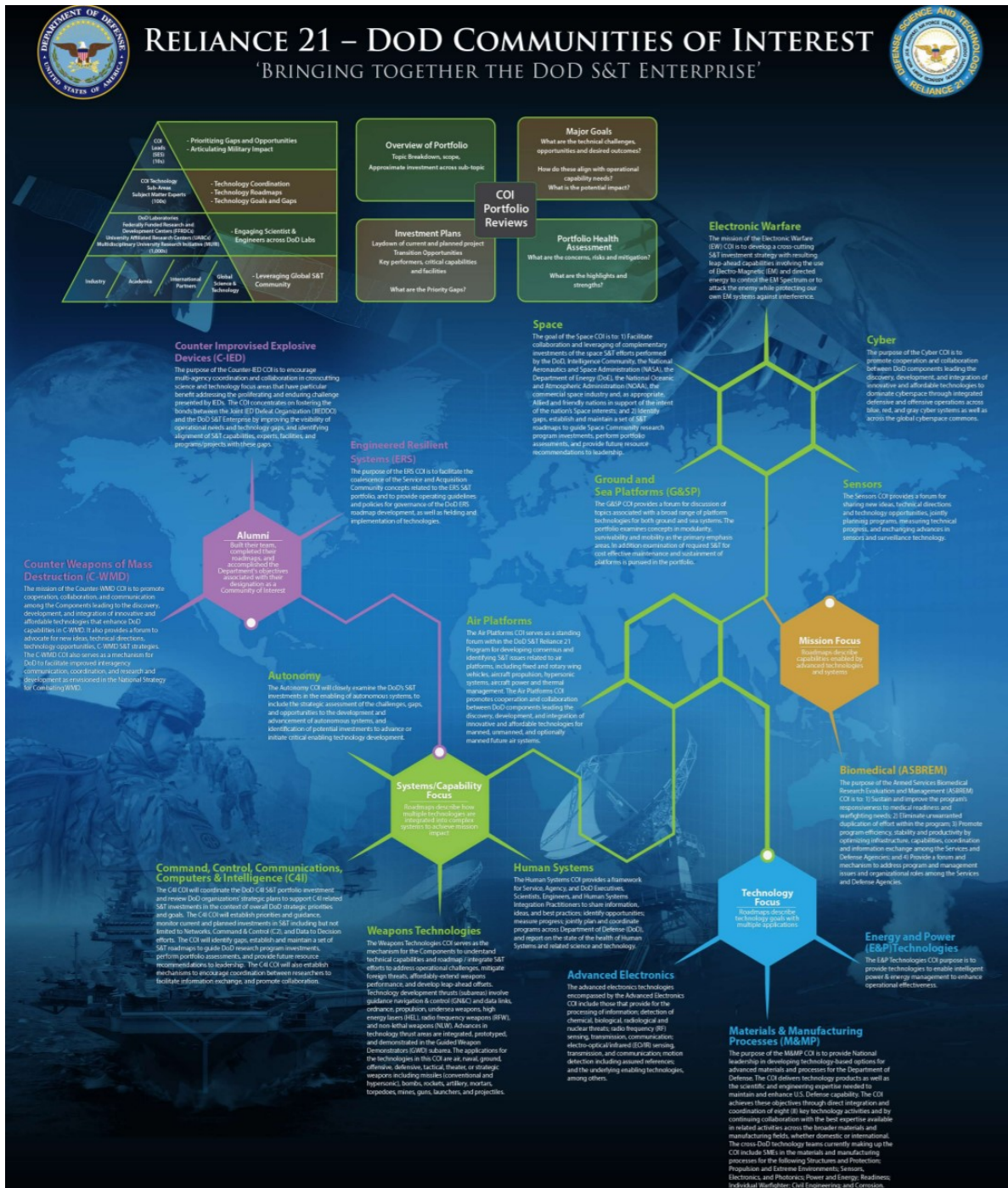
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<sup>18</sup> Better Buying Power is the implementation of best practice to strengthen the Defense Department's buying power, improve industry productivity, and provide an affordable, value-added military capability to the Warfighter. Launched in 2010, Better Buying Power encompasses a set of fundamental acquisition principles to achieve greater efficiencies through affordability, cost control, elimination of unproductive processes and bureaucracy, and promotion of competition. Better Buying Power initiatives also incentivize productivity and innovation in industry and Government, and improve tradecraft in the acquisition of services. Retrieved from [https://www.ustranscom.mil/dbw/docs/BBP\\_Fact\\_Sheet.pdf](https://www.ustranscom.mil/dbw/docs/BBP_Fact_Sheet.pdf)

able to give insight to government in regarding to research and development policy. Specifically, the government shares its long term goal and current situations compared to the goal as well as the history of projects and technology information needing research and development for each area.

Communities of Interest in Defense Innovation Marketplace were “established as a mechanism to encourage multi-agency coordination and collaboration in cross-cutting technology focus areas with broad multiple Component invest. [It] provides a forum for coordination Science and Technology strategies across the Department [of Defense], sharing new ideas, technical directions, and technology opportunities.” (Defense Innovation Market, n.d.) Currently, Communities of Interest provides Tier 1 Taxonomy of 17 areas in detail: advanced electronics, air platforms, autonomy, biomedical asbrem, biotechnology, C4I, counter-IED, counter-WMD, cyber, directed energy, electronic warfare, energy and power technologies, engineered resilient systems, ground and sea platforms, human systems, kinetic weapons, materials and manufacturing processes, sensors, and space. The Department of Defense explains the purpose of each taxonomy in the strategies of national defense, dividing into 4 categories – mission focus, systems/capability focus, technology focus, and alumni – and suggests detailed description for each taxonomy. (Figure 14, Defense Innovation Marketplace)

Figure 14. Poster of Communities of Interest 2018



Source: Defense Innovation Marketplace. (n.d.)

The autonomy community of interest, for example, defines its aim as “examin[ing] the [Department of Defense’s science and technology] investments in the enabling of autonomous systems, to include the strategic assessment of the challenges, gaps, and opportunities to the development and advancement of autonomous systems, and identification of potential investments to advance or initiate critical enabling technology development.” (Defense Innovation Marketplace, n.d.) It also suggests 4 specific technologies to achieve this mission:

(a) Human/Autonomous System Interaction and Collaboration (HASIC): The keys to maximizing the human-agent interaction are: instilling confidence and trust among the team members; understanding of each member’s tasks, intentions, capabilities, and progress; and ensuring effective and timely communication. All of which must be provided within a flexible architecture for autonomy; facilitating different levels of authority, control, and collaboration.

(b) Machine Perception, Reasoning and Intelligence (MPRI): Perception, reasoning, and intelligence allows for entities to have existence, intent, relationships, and understanding in the battle space relative to a mission.

(c) Scalable Teaming of Autonomous Systems (STAS): Collaborative teaming is a fundamental paradigm shift for future autonomous systems. Such teams are envisioned to be heterogeneous in size, mobility, power, and capability.



(d) Test, Evaluation, Validation, and Verification (TEVV): The creation of developmental and operational T&E techniques that focus on the unique challenges of autonomy, including state-space explosion, unpredictable environment, emergent behavior, and human-machine communication.

In addition to that, the Department of Defense explains scope/thrust areas, impact on capability needs, focus going forward, engagement opportunities for industry, and success stories in autonomy taxonomy. This information helps business to understand concerns and directions of the Department of Defense and to have insight to participate into the national security business. (Figure 15, Defense Innovation Marketplace) For example, it discloses information of scope/thrust areas, impact on capability needs, focus going forward, and engagement opportunities for industry. Moreover, it shares outcome and success stories so it encourages businesses to participate into projects for national security.

Figure 15. Poster of Communities of Interest of Autonomy

## RELIANCE 21 – DOD COMMUNITIES OF INTEREST AUTONOMY

### Scope/Thrust Areas

- Machine Perception, Reasoning and Intelligence
  - Understanding the Situation / Environment
  - Robust Capabilities
  - Common Representations / Architectures
  - Learning & Reasoning
- Human/Autonomous System Interaction and Collaboration
  - Calibrated Trust & Transparency
  - Common Understanding & Shared Perception
  - Human Agent Interaction
  - Collaboration
  - Interactive Learning
- Scalable Teaming of Autonomous Systems
  - Space Management Operations
  - Sensing / Synthetic Perception
  - Mission-Level Task Allocation / Assignment
  - Robust Self-Organization, Adaptation, & Collaboration
- Test, Evaluation, Validation, & Verification
  - Methods, Metrics, & Tools Assisting Requirements Development & Analysis
  - Evidence-Based Design & Implementation
  - Cumulative Evidence through Research, Development, & Operational Testing
  - Run-Time Behavior Prediction & Recovery
  - Assurance Arguments for Autonomous Systems

### Impact on Capability Needs

#### Unmanned Ground Logistics Efforts

- US/UK Coalition Assured Autonomous Resupply Demonstration: Integrated US Leader Follower technology onto UK tactical logistics trucks
- 50,000 Mile Leader Follower Reliability & Maintainability Extended Warfighter Experiment culminating in logistics exercise
- Expedited Leader Follower – Directed Requirement to integrate 70 leader follower systems onto Palletized Load System Tactical Vehicles for operational assessment

#### Mission Planning for Mine Countermeasures (MCM)

- Fully autonomous mission planning for Low Frequency Broadband MCM reacquisition and identification
- Field tested for 2+ days onboard the NRL's Reliant 21<sup>st</sup> Heavyweight AUV

#### Collaborative Unmanned Aircraft Demonstration

- > 500 hrs flight testing with up to 6 live and 25 virtual a/c controlled by a single Commander from a single screen
- Demonstrated SEAD/DEAD mission in GPS and communications denied environment

#### Tracking / Avoidance of Surface Threat Avoidance

- Demonstration of autonomous reactive tracking and avoidance of surface vessels using passive planar radar
- Performed 2+ days of field trials tracking and avoiding the R/V Revolution using the Reliant 21<sup>st</sup> AUV

### Engagement Opportunities for Industry

- Defense Innovation Marketplace – Centralized, online resource on DoD S&T, R&D investment priorities, capability needs, & technology interchanges
- Defense Innovation Unit (DIU) – The nexus between non-traditional companies and the DoD
- CRADAs – No-cost resource sharing agreements allow access to unique experimental and testing capabilities of DoD and national labs
- DoD Labs – Companies can partner to develop technology and methodologies within a cost-effective open architecture
- Workshops / Interchange Meetings – Companies can partner with DoD Labs in technical discussions and interchanges about common technology challenges, experiences, and needs through co-workshops or other events

### Focus Going Forward

- Effective human-machine collaboration to enhance overall team performance, increase safety for human partners, & offset brittleness
- Versatile standards for autonomy modeling, design, & interfaces
- Learning in complex data environments: resource-constrained AI processing at point-of-need
- Powerful new capabilities for testing & evaluating autonomy
- Continuous, real-time V&V of autonomy as it adapts in the field

### Success Stories

Objectives	Annual Progress
Determine the potential military utility of autonomy technologies.	Military endorsed ASG "un-tilted" applications. Autonomy in motion (AUM) system evaluated by FVEIS military experts at two trials.
Advance and demonstrate human-autonomy teaming through simulation and live trials.	First four-eyes test of "MUF" system with multiple allied-to-developed software parts.
Improve interoperability of emerging FVEIS autonomous systems.	Successful test of BIRACT system with live small UAS cooperatively with all ground, sea virtual autonomous systems.
Harness industry developments for FVEIS military requirements.	Engaged industry and identified a range of LAM, USV, USV, UAV platforms and systems.

#### Autonomy Strategic Challenge (ASC) with The Technical Cooperation Program (TICP)

### Outcomes:

- Force Multiplication by small team of human operators controlling a large fleet in a dynamic threat environment
- Interoperability architecture to provide guidelines for industry innovation and avoid Defense exposure to proprietary lock-in
- Integration of FVEIS autonomy technologies for faster and more informed decisions that saves on National development costs
- Agility by merging tactical and operation control for faster military decision cycles

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Source: Defense Innovation Marketplace. (n.d.)

Looking at the Business category on Defense Innovation Marketplace, on the other hand, Department of Defense provides information following who mainly supports and funds projects. This section is categorized 14: Air Force resources, Army resources, basic research, Combatant Commands, Department of Defense agencies, Department of Defense laboratories, FFRDCs (Federal Funded Research and Development Centers) and UARCs (University-Affiliated Research Centers), ManTech program, Marine resources, Navy Resources, Rapid Innovation Fund, Small Business, Strategic Documents, Warfighting Lab Incentive Fund. For each category, Department of Defense discloses the business opportunities in which private will be able to participate or engage, related documents, questions and answers, and contact for projects.

The core value of Defense Innovation Marketplace that should be noteworthy is sharing information with any entities are interested in defense industry or national security. Department of Defense discloses as many as it can including technologies currently needed to be undertaken and even the directions of future defense policy and technology development. This strategy expands the opportunities that business will engage projects relating to national security. Also, it leads that the private and public will be able to discuss projects at the same page, so the communication between them would be more efficient and fruitful.

## **Participation in Defense Project**

## **Independent Research and Development**

Independent research and development, hereinafter “IR&D”, is R&D initiated and conducted by defense contractors independent of Department of Defense control and without direct Department of Defense funding. IR&D includes: (a) basic research, (2) applied research, (3) development, and (4) systems and other concept formulation studies. IR&D does not include R&D performed under grants or contracts from the Government or third parties and does not include technical efforts in the support of bid or proposal activities according to Defense Innovation Market. (n.d.).

Specifically, Department of Defense discloses the information related to acquisition including military needs and research and development plans as much as possible, so businesses are led voluntarily and actively to participate in research and development process in the field that Department of Defense needs to develop. Furthermore, businesses themselves will be able to use its results of IR&D. IR&D encourages businesses to develop high technologies by their own for national security. Under IR&D, thus, businesses propose and develop projects considering the needs of Department of Defense. Government, then, supports the cost, 80% at most, that business spends on the project afterwards regardless the result was successful or not. The rest of cost would be possibly compensated with overhead cost if the government decides to purchase its product (Jang et al., 2014, pp 126-128)

The IR&D brings merits to both the government and businesses. The

government targets through IR&D to increase the level of military capabilities as well as boost spin-off effect which led the great economical ripple effect after the First and Second Offset strategies. The business will be able hold the right of patent, so, based on the patent, it can take technological competitive advantages in domestic as well as international market. IR&D, in fact, not only encourages businesses to develop future-oriented weapon system through creativity and highly qualified technology of the private sector but also expands the scope of resources that the government is able to use.

### **Competitive Prototyping**

The competitive prototyping generally means “an approach in which two or more competing teams or organizations develop prototype during the early stages of a project. The competing prototypes are compared, and ultimately the one that best addresses the issue(s), problem(s), or challenge(s) is chosen”<sup>19</sup> Although this type of R&D had been in Department of Defense since World War II called “Fly-out Program”, it became in the spotlight after the memorandum of the former Vice Secretary of Defense, John Young, in 2007; then, specified in 2009 with enacting Weapons System Acquisition Reform Act according to Jang et al. (2014, p 118)

The competitive prototyping is mandatorily applied to most weapon

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<sup>19</sup> <https://www.mitre.org/publications/systems-engineering-guide/acquisition-systems-engineering/contractor-evaluation/competitive-prototyping>

system developing projects in their early state. Competitive prototyping may cost more than single prototyping in early stage of development. However, it leads companies to compete, so that the government will be able to take advantages of reducing total net cost, improving quality of weapon systems, lowering the risk of failure causing possibly from single company development, and increasing the level of technology. Even government funded institutions such as DARPA have applied to competitive prototyping in their development process. Exceptions would be applied to three cases: (a) the costs that more than two companies requires is over the benefits that the development may bring during the whole process, (b) the level of technology needed is not that high so the R&D might result a tiny progress to related technology or might not bring net benefit, and (c) competitive prototyping would be against national security as Jang et al. (2014, pp 119-123) described.

The costs for prototyping development would come from the government. The government provides the required operational capability, hereinafter “ROC”, and any companies offer their proposals based on the ROC. The government evaluates all the proposals that each company turns in and, then, determines more than two companies to support prototyping development costs. With the budget the government supports, companies develop prototypes. There is no additional fund even if the cost the company spends on prototyping more than the government fund – the company should cover the additional cost by its own; likewise, the government would not support the additional cost even if the prototype is not selected as a mass produced product. The reasons for not funding

additionally are that the government fully supports all the cost based on the business's estimate for the beginning of the prototyping development process, and that the company will be able to have technology that might be used in future though the government support – this advantage can be applied to companies not only succeeding the development prototyping but also failing it. For instance, according to Jang et al. (2014, p 123), YF-17 prototype model of NG was not the one that won as a mass producing product, but it would be selected as naval F-18 Hornet projects. Similarly, the prototype of Boeing was used for developing drone although it was not selected for F-35.

To encourage businesses to participate in military R&D, the government grants non-exclusive license to the business which succeeds in developing a prototype although an intellectual property right belongs to the government. With it, businesses are able to take advantages of not only the synergy effect from sharing technology with other businesses but also the ripple effect by developing and securing complementary technology.

### **Cooperative R&D Agreements**

Cooperative R&D Agreements, hereinafter “CRADA”, is the program that aims to encourage transfer and utilization of technologies among research centers funded by the government, businesses, and universities according to Jang et al. (2014, p 125) This program has started in 1986 by Federal Technology Transfer Act, and expanded to all public research institutions including military. CRADA

is often applied to core or original technology development process more than system development one. Based on that, according to Jang et al. (2014, pp 25-126), the government aims to:

- (a) encourage to utilize the technologies developed with the government R&D fund by transfer them to private sector,
- (b) reduce costs, create new markets, and strength industrial competitiveness by co-development between public research institutions and private companies for promising technology development process and share of intellectual property rights,
- (c) expand joint use of manpower, equipment, facilities, and services though executing R&D together,
- (d) promote quick development and transfer of technology by agreeing within 60 days of negotiation according to a simple contract procedure.

Thirteen departments and public research institutes including NASA, Department of Defense, Veterans Administration, Department of Transportation, Joint Chiefs of Staff, and Army, Navy, and Air Force of the United States of America have participated in CRADA as a Federal Laboratory Consortium as of 2018. Especially, CRADA in military usually is executed by research centers such as Adelphi Laboratory Center or Air Force Research Laboratory. (Jang et al. 2014, p 126)



CRADA process starts with the government's request for proposal, hereinafter "RFP", including the information of the whole cost for the research. Based on that, a business decides its portion out of the whole cost by its own and suggests it to the government. Although the proportion of investments between the government and company varies in each project, the government commonly pays 50 to 70 percent and the company bears the rest.

CRADA attracts businesses in that a business participating in research and investment will be able to take a favorable position in system development that might go on in near future compared to other companies, considering that the project that develops core technology is predicted to hold high possibility to apply to system development so the project is worthy to invest in advance. Furthermore, participating in CRADA may bring profits to the company with high probability in that the government usually grants exclusive or regular licenses to the co-investing company according to the proportion of investment although the intellectual property right from the research is shared between the government and the company following the proportion of the investment.

## **Conclusion**

The United States of American government has acknowledged and admitted a huge wave of innovation with regards to leader of technology innovation. Although succeeding the government-led innovation during the First and Second Offset strategy, it never forgot to foster private sector regarding

defense technology. It expanded its budget and organized the systems that encouraged businesses to participate in defense industry. Based on that, the government has been able to cooperate with business in the era of private-led technology innovation.

## **5. Creating Economic Value**

### **Background**

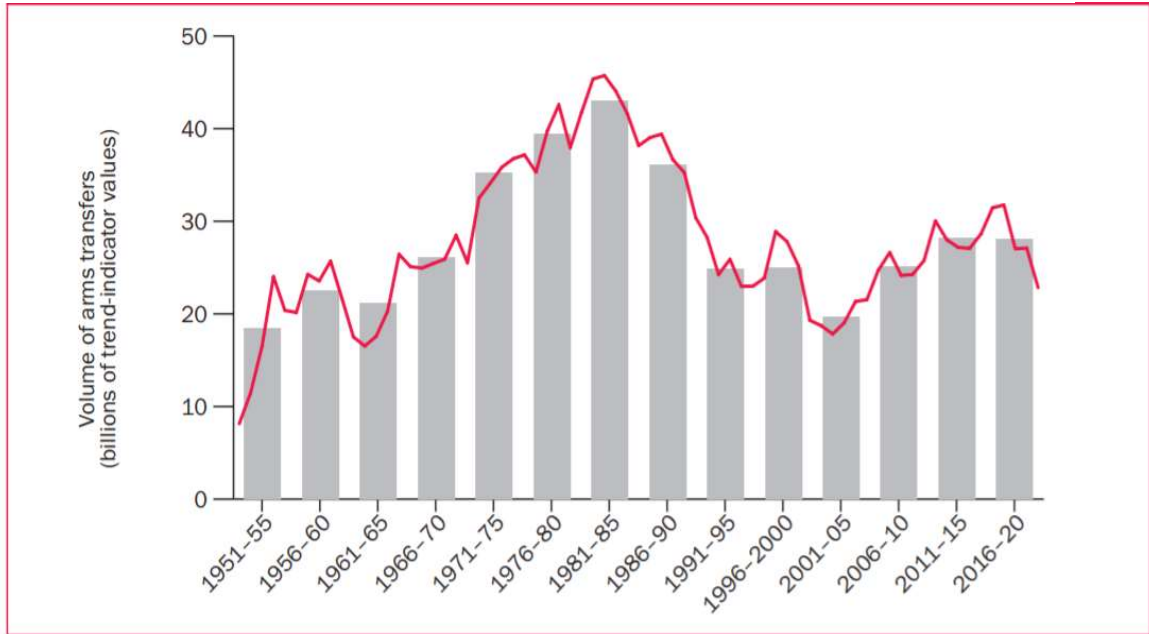
The market of defense industry has been expanded internationally. According to Summary of SIPRI<sup>20</sup> Yearbook 2021, the world spent 1,981 billion dollars in 2020 on military. This amount of expenditure was “2.6 percent higher than in 2019 and 9.3 per cent higher than 2011”. Among all nations, the United States of America spent the most, 778 billion dollars, and has increased its expenditure 4.4 per cent more than 2019. (2021, pp 12-13)

As military spending increased, international arms market also has been expanded. SIPRI stated in its yearbook 2021 that “the volume of international transfers of major arms in the five-year period 2016-2020” was nearly 30 billion dollars. Based on “[arms-exporting countries’ publishing] figures on the financial value of [the] arms exports”, the total value of the global arms trade was at least 118 billion dollars in 2019. (Figure 16, 2021, pp 14-15)

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<sup>20</sup> SIPRI (Stockholm International Peace Research Institute), establish in 1966, is an independent international institute dedicated to research into conflict, armaments, arms control and disarmament. It has published yearbook regarding to armaments, disarmaments, and international conflicts.

**Figure 16. The Trend in Transfers of Major Arms, 1950-2020**



Source: SIPRI. (2021)

Note: The bar graph shows the average volume of arms transfers for 5-year periods and the line graph shows the annual totals.

The United States of America has been one of two largest suppliers regarding exporting armaments since 1950 with Russia following SIPRI. It exported its arms for “37 per cent of the global total [in 2016-2020, which was] 15 per cent higher than in 2011-2015.” Furthermore, among top 25 arms companies, 12 companies are in North America, mostly in the United States, and the top five are based in the United States of America. (2021, pp 14-15) Considering the figures, the United States has proved creating a huge economic value from weapon industry.

**Table 2. The Main Exporters and Importers of Major Arms, 2016-2020**

Exporter	Global share (%)	Importer	Global share (%)
1 USA	37	1 Saudi Arabia	11
2 Russia	20	2 India	9.5
3 France	8.2	3 Egypt	5.8
4 Germany	5.5	4 Australia	5.1
5 China	5.2	5 China	4.7
6 UK	3.3	6 Algeria	4.3
7 Spain	3.2	7 South Korea	4.3
8 Israel	3.0	8 Qatar	3.8
9 South Korea	2.7	9 UAE	3.0
10 Italy	2.2	10 Pakistan	2.7

UAE = United Arab Emirates.

Source: SIPRI. (2021)

### **Defense Export Strategy**

The strategy of defense export of the United States of America has been developed historically under the aim of preventing the spread of communism and supporting the allies after World War II, based on national security strategy.

Basically, the core of the United States of America's national security strategy has been to maintain peace by protecting its own country and keeping the world's order sticking with the democratic value. Particularly, by providing security supports toward its allies and security cooperation, the United States has been not only able to promote its national interest of the United States of America itself but also considered a significant policy for removing the threat to national security.

Specifically, security assistance which the United States of America usually offers to its allies refers to series of programs that provide defense materials, military education, and defense related services to foreign countries by transfer, loan, lease or cash sale authorized by related laws and regulations such as Foreign Assistance Act and Arms Export Control Act following Defense Acquisition Program Administration of the Republic of Korea. (2014, p 5) The United States military support to its allies aims to resolve the threat of war and sustain the world's order by strengthening the alliance; meanwhile it is restricted to be executed only when the action is suitable for its national interest. By promoting and regulating security assistance to the allies at the same time, the United States is able to protect its national interest as well as national security.

## **Policy of Supporting Exports of Weapon Industry**

### **Foreign Military Sale**

Foreign Military Sale, hereinafter “FMS”, is a direct export of defense materials including weapons. Specifically, according to Defense Security Cooperation Agency, FMS is “the United Government’s program for transferring defense articles, services, and training to our international partners and international organization.” FMS is considered as a government-to-government transaction, compared to Direct Commercial Sale, in that the United States of American government purchases weapons for its ally to want to buy on behalf of the allied country and passes them over and, then, the ally pays for the costs later to the United States of American government.

Under FMS, the government of the United States of America not only guarantees the quality of the defense articles and performance of contracts but also provides follow-up logistics support; meanwhile, the United States of America does not provide information regarding technologies and prohibits disassembly of equipment in order to protect the intellectual property rights. Moreover, the United States of American government differentiates administrative procedures and cost of each country considering the relationship with the United States of America and every transaction is under the strict control of Congress of the United States of America. (Gilman et al, 2014)

### **Foreign Military Financing Program**

Foreign Military Financing Program, hereinafter “FMF”, is a system that provides a credit to allies for security supports with the United States of

American government's budget so allies would be able to purchase the United States military articles, services, and training according to Defense Security Cooperation Agency. This program has been started by being authorized by Arms Export Control Act for the President "to finance procurement of defense articles and services for foreign countries and international organizations ... based on either a grant or direct loan basis."<sup>21</sup>

FMF is one of the effective strategies to increase the volume of the United States of America's defense exports as well as national security as Jang et al. stated. (2012, pp199-200) From the view of national security, first of all, FMF would support strengthening the security of allies and, furthermore, stabilizing the international security order by providing military aids with the forms of defense articles, services, and training rather than cash grants. Secondly, regarding defense exports, FMF is basically executed on direct loan basis so it is ultimately used to purchase weapons made in the United States of America, which will be able to increase her military exports. Lastly, the budget required to support allies is mainly funded from FMS or Direct Commercial Sale.

### **International Military Education and Training**

International Military Education and Training program, here in after "IMET", is a system that provides military of ally opportunities to be educated

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<sup>21</sup> <https://www.dsca.mil/foreign-military-financing-fmf>



and trained at the United States military academy or institutes. According to Defense Security Cooperation Agency, “the [primary] goals of IMET are to: train future leaders, create a better understanding of the United States, establish a rapport between the United States military and the country’s military to build alliances for the future, enhance interoperability and capabilities for joint operation, focus on professional military education, allow countries to use their national funds to receive a reduced cost for other Department of Defense education and training, and provide English Language Training assistance.”<sup>22</sup>

Considering that, IMET helps military cooperation by creating bonds between the United States of America and its allies as well as providing security supports with educating advanced strategies and tactics and training important equipment operation and maintenance of the United States military. From the perspective of defense industry, additionally, military of allies experienced advanced military technologies of the United States of America become familiar to its defense strategies and recognize the excellence of the United States of America’s defense articles. Throughout those processes, military personnel would be human resources to maintain close relations between allies and the United States of America. This relationship, ultimately, will affect arms trade in future directly, at least indirectly, to assist exports of the United States of American weapons.

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<sup>22</sup> <https://www.dsca.mil/international-military-education-training-imet>

## **Exemption from Royalty for Technology**

The United States government exempts defense export companies from royalties for technology. The royalty exemption has its meaning as a method to promote indirectly the United States weapon exports by providing a competitive advantage in price and encouraging to develop defense technology and articles.

## **Organizations Supporting Exports**

The United States of American government has no organization only in charge of defense industry export; meanwhile, various departments and organizations are supporting export of defense industry depending on the field in charge from the President Office to embassies abroad. Among them, it is noteworthy to actual administrative execution organizations under Department of Defense and State.

Defense Security Cooperation Agency is responsible for overall management of export of defense industry. It is charge of planning, executing, and supervising of national security support program including FMS, managing loans and financial programs such as FMF, and guaranteeing exports of defense article. Moreover, it is an integrated gate for international logistics cooperation and arms sales negotiation with allies as well as for companies of defense industry to access Department of Defense. Besides, under the control of Department of Defense, Defense Technology Security Administration takes

responsibility for international cooperation to protect defense technology and to prevent leakage of core technology regarding to export of military articles. Also, it is in charge of maintaining the superiority of the United States defense technology and promoting the integrity of the overall defense industry.<sup>23</sup>

The Office of Undersecretary of State for Arms Control and International Security advises to the President on arms control and exports of defense articles and services. Also, under the order from the President, it determines the amount of economic and military support as well as arms sales to allies and synthesized information on arms sales and export control collected from embassies located in each country. In addition to that, under the Assistant Secretary of State for Political and Military Affairs, Directorate of Defense Trade Controls works for licensing commercial sales export of defense articles and executing laws and policies regarding defense export control.<sup>24</sup> Lastly, Security Assistance Organization, spread to the embassy of each country and consisting of military and civilians, take responsibility for FMS management and education and training, evaluation for military force of host countries, and cooperation and administrative support in military as an actual execution agency of export and control in defense industry.<sup>25</sup>

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<sup>23</sup> <https://www.dtsa.mil/SitePages/default.aspx>

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[https://www.pmdtc.state.gov/ddtc\\_public?id=ddtc\\_kb\\_article\\_page&sys\\_id=8249bf04dbc7bf0044f9ff621f96197d](https://www.pmdtc.state.gov/ddtc_public?id=ddtc_kb_article_page&sys_id=8249bf04dbc7bf0044f9ff621f96197d)

<sup>25</sup> <https://www.state.gov/about-us-office-of-security-assistance/>

## **Conclusion**

The United States of American government designed its defense industry export system delicately considering both national security and economic benefit. By supporting its allies in military, the United States of America can strengthen its relationship with them and stabilize the world order, as status quo. Also, by the government's acting as a main trader and regulator, it can not only protect its companies and technologies but also create economic profit as a whole nation.

## **V. Implication and Policy Suggestion to South Korea**

### **Implication of the United States Policy**

South Korea is facing a huge face of change with regards to its national security. The threats to national security have been more complicated and profound; meanwhile, the government has the limitation on its resources to respond by its own. To overcome the challenge and change it to chance to strengthen its national security, the United States of America's system is able to have such a good implication to South Korea.

First of all, it is noteworthy that the United States of American government has been connected with private sector by supporting as well as being supported by them. It has spread widely its R&D results to private sector so to bring nation's prosperity via the government as well as private sector in perspective of economy and national security.

Especially, the United States of America has encouraged businesses to engage more actively and deeply from the first to the final stages of defense research and development procedure. By announcing Defense Innovation Initiative, so called the Third Offset Strategy, it has focused to build a structure to work with business. All members tried to understand businesses and find the way to cooperate with them. The leadership of Department of Defense never hesitated to admit that it is the business to lead current technology innovation and

military should take advantage from it. To do so, they also courageously restructure organizations and systems to work. It is the power that the United States of America has sustained its dominance in economy and national security for decades.

Secondly, the United States of America created chance that new technologies were developed by expanding its budget on defense R&D steadily and encouraging cooperation between public and private sector. The government of the United States of America has facilitated technology transfer among military, academics, and businesses, through thirty-nine federal government R&D centers and funding for academic research centers as well as encouraging co-research. Additionally, it disclosed information to the public as much as possible only except confidential one. It led technology innovation such as GPS and stealth after the Second Offset strategy, and, consequently, became infrastructure for responding the current technology innovation led society.

Thirdly, the United States of American government supports companies to have competency in the world armament market. On one hand, it focused on raising technology level of domestic companies by encouraging defense technology R&D from basic to appliance stages. On the other hand, it created market for companies to export by the government's active engagements as well as restrictions. Considering that defense industry is inevitable connected to national security, the government's role in the market would be justified, so the

United States of American government's strategy in the world defense market has worked effectively and efficiently.

## **Suggestions**

First of all, South Korea military needs to expand the businesses' opportunities to engage defense R&D from the first stage. Considering that private sector is dominant in developing technology, public sector needs to focus to suggest the direction forward, support the society move toward it, and manage how the direction and the society goes well together. Especially, under the current society that technology evolves so fast, military cannot help facing limitation to figure out threats and how to respond based on cutting edge technology. So, it should open its procedure technology is able to involve in the stage that conceptualize threats. Eventually, how to respond against threats will be changed following various types of threats defined with engagement of technology.

Secondly, to encourage private in defense R&D procedure, military should not hesitate to regenerate itself. Information should be disclosed more specifically and deeply. It is currently sharing its strategy of national security publicly; however, it is not enough. Disclosed information should be more specific and profound enough for private sector to embody its business model in nation's national security strategy. In addition to that, the way to work needs to

be renovated being considerable and favorable to businesses. DIU is noteworthy in that it stimulated to try a new way to work in the government.

Also, the government of South Korea should build an infrastructure system for a fair competition in defense market and cooperation among public, academic, and private sectors. By spreading out funds to small research focusing businesses or encouraging co-research between academics and businesses, beyond funding focusing on a few major companies, the government can strengthen base of defense technology. Also, from various suggestions from various participants, the national security will be able to leap off for a few creative ideas. Also, it will be able to help businesses to consider export its' product from starting R&D.

Finally, the government will be focusing policy on creating market abroad instead of doing R&D directly. It should make strategic policy to expand exports based on understanding potential weapon importing nation's national security strategy. South Korean government needs to remember that the United States of America supports its allies and partners in national security with exporting weapons made by its domestic companies.



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