

# Lessons from the Iron Dome

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Israel has been under rocket attack for many years.<sup>1</sup> Particularly memorable are the shelling of Galilee panhandle towns in the 1970s, the Second Lebanon War in 2006, when Israel suffered over 4,000 rocket attacks in one month, and the ongoing rocket fire from the Gaza Strip over the past decade. Over the years, the State of Israel has developed a doctrine for defense against high trajectory weapons, of which rocket fire is one type. This doctrine is based on layers of defense, from passive defense, to active defense – involving interception of rockets and missiles by the Iron Dome system, David’s Sling (in development), the Arrow 2, and the Arrow 3 (in development), to offense against launchers on their bases.

This article focuses on the Iron Dome system, which entered into operational service in early 2011 and demonstrated what it was capable of within a few months of its deployment. The article attempts to examine the lessons from the system’s deployment and to reassess the decision about purchasing the system. It will also examine future ramifications of deploying this system and other systems that are expected to enter into service in the near future.

## Background

Iron Dome is a system for intercepting rockets and artillery shells with ranges of up to 70 kilometers.<sup>2</sup> It was developed by Rafael Advanced Defense Systems in cooperation with Elta Systems, which produces the radar, and mPrest, which is responsible for the command and control system. The system uses a unique interceptor missile for shooting down rockets. Iron Dome batteries include a radar system, a command center,

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and three launchers, each of which carries twenty interceptor missiles. One of the system's important advantages is its ability to identify the anticipated point of impact of the threatening rocket, to calculate whether it will fall in a built-up area or not, and to decide on this basis whether or not to engage it. This prevents unnecessary interception of rockets that will fall in open areas and thus not cause damage.

The system's development began in 2005 at the initiative of Brig. Gen. Dr. Danny Gold, head of the Defense Ministry's Research and Development Unit, and received a boost following the Second Lebanon War in the summer of 2006. In 2007, the Defense Ministry decided to procure the system and step up the pace of development. The firing of rockets from Gaza during Operation Cast Lead further accelerated deployment of the system. Thus, the final tests on the system were conducted in late 2010, and in early 2011, the first battery was delivered to the Israel Air Force. In late March 2011 the chief of staff, at the directive of the Defense Minister, ordered that the system be deployed to protect civilians. On March 28, 2011 the first battery was deployed in the Beersheba area, and one week later, a second battery was deployed to protect Ashkelon. On April 7, 2011, Iron Dome shot down its first rocket, which was fired from the Gaza Strip in the direction of Ashkelon.

At the time of this writing, there are five Iron Dome batteries. The third battery was deployed in June 2011 and the fourth in March 2012, while the fifth battery, which was originally planned for deployment in early 2013, was rushed into service in November 2012 during Operation Pillar of Defense to protect the Gush Dan area.<sup>3</sup> By late 2013, there are expected to be nine batteries,<sup>4</sup> and the current plan is to purchase a total of thirteen batteries.<sup>5</sup> During Operation Pillar of Defense, the Ministerial Committee on Procurement decided to allocate an additional 750 million shekels to expand procurement of the Iron Dome system.<sup>6</sup> The integration of these batteries means that a large number of soldiers will need to be recruited and trained, both in the regular army and the reserves.

### **Operational Firing**

By April 2012, a year after Iron Dome's first operational interception, the system had demonstrated ninety-three interceptions in various incidents.<sup>7</sup> The first two most serious rounds of escalation took place in August 2011 following the shooting attack near Eilat, when over the course of six days

145 rockets and 46 mortar shells were fired at Israel, and in March 2012, when over the course of three days, 173 Grad and Qassam rockets and 37 mortar shells were fired after the killing of Zuhair al-Qaissi, a leader of the Popular Resistance Committees.<sup>8</sup> In the round of escalation in August 2011, in spite of Iron Dome's success in interception, a not-insignificant amount of damage was done to people and to property, including nineteen wounded and one person killed (in Beersheba). In March 2012, four people were wounded as a result of rocket fire. Data released about this round allows us to assess the effectiveness of Iron Dome in real fighting: the system successfully shot down 56 rockets out of 73 rockets employed. (This means that 100 of the rockets that were fired were aimed at open areas, where no damage was caused.) This is a success rate of 76.7 percent, a respectable rate by any standards.<sup>9</sup>

Iron Dome's most conspicuous success was during Operation Pillar of Defense in November 2012. The operation began in the afternoon of November 14, 2012 with the killing of senior Hamas operative Ahmed Jabari. By the time a ceasefire took effect on the evening of November 21, 2012, 1,506 rockets had been fired at Israel. Of these, 875 had fallen in open areas, and thus were not intercepted by Iron Dome. Another 152 launches were considered to be failed launches (this apparently means rockets that fell in the Gaza Strip). Iron Dome intercepted 421 rockets, and 58 rockets fell in built-up areas and caused damage. Five Israelis were killed by rocket launches and 240 were injured. According to the IDF spokesman, Iron Dome achieved a success rate of 84 percent.<sup>10</sup>

Operation Pillar of Defense proved the capabilities of the system, which justifiably won accolades, but the lessons from the operation are more complex. The operation also proved the tremendous importance of passive defense, specifically, the use of sirens for early warning, along with passive protection. One conspicuous example was the incident in which a rocket struck a residential building in Rishon Lezion and destroyed an apartment, but the residents, who were in the apartment's protected space, emerged unscathed. The results of the operation also proved that 100 percent protection is impossible.

### Criticism

Along with the acclaim earned by the Iron Dome system, there was also not-insignificant criticism from various sources and for various reasons.

The defense establishment was harshly criticized because the Iron Dome system was chosen over other systems that the critics believed to be better, because of the promises of protection, which the critics felt were not realistic, and because of the large sums of money invested in the system.<sup>11</sup> What follows is a review of the criticism of the Iron Dome system broken down on a number of levels: technical-tactical, operational, and political.

### *Technical-Tactical Criticism*

From a technological point of view, the system attained extraordinary success.<sup>12</sup> Iron Dome is a unique system, with nothing else like it anywhere in the world. There is only one other operational weapon system in the world that is designed to shoot down short range rockets and mortars: the US Army's Centurion system, which is based on the Phalanx anti-ship missile defense system. It intercepts rockets and mortars at short ranges by means of a fast 20-mm cannon. The Centurion has been used to protect US Army forces and US facilities in Iraq – in particular, in the "Green Zone" in Baghdad, a fortified area that was the command center of US activity in Iraq and was subject to repeated attacks.

Other systems have been proposed or are in development in various places around the world. The best known in Israel is the Skyguard, proposed by Northrop Grumman. The system is based on the Nautilus tactical laser system, developed in Israel in the 1990s. Its supporters claim that its development has been completed, but it has no purchasers and is not operational anywhere in the world.<sup>13</sup>

On the level of technology several arguments have been leveled against the Iron Dome system:

- a. Its inability to cope with very short range threats. The system's minimum range has not been published, but according to critics, it cannot shoot down rockets or shells whose range is less than 5-7 kilometers, and in any case, it is not capable of shooting down mortar shells. While the system was being developed, it was announced that it would protect Gaza perimeter towns and cities. Among the threats mentioned were mortars, whose range usually does not exceed several kilometers. To be sure, such promises were generally made by political figures and not by the system's designers. The critics argue that the defense establishment should have favored acquisition of existing systems – Skyguard or Centurion – or integrating these systems with Iron Dome in order to cover the shorter distances.<sup>14</sup>

- b. As a result of the system's response time, critics claim that it will also have a hard time coping with rockets fired on flat trajectories at even longer ranges – up to 16-18 kilometers, according to the critics.
- c. The cost of interception is high. The cost of the interceptor missile is about \$40,000-50,000. Furthermore, in some cases, two interceptor missiles are fired at one target, which further raises the cost of interception. This will greatly limit the State of Israel's ability to acquire interceptor missiles for a prolonged conflict.<sup>15</sup>
- d. The system has a "saturation point." It is capable of engaging a certain (unpublished) number of targets at the same time, and no more. Additional rockets fired in a crowded salvo could succeed in breaching defenses and cause damage.

A full discussion of the system's technology is beyond the scope of this article. Suffice it to say that all of the systems mentioned (like any technological system) have limitations, and any deliberation of a system must consider all its aspects, not only the technological.

### *Operational Criticism*

Operation Pillar of Defense and the rounds of escalation that preceded it proved that Iron Dome, in spite of its success, does not provide total protection. Rockets penetrated its defense, causing damage to property and casualties.

However, these events also demonstrated that the real problem was not the physical damage that the rockets caused – which in the final analysis was negligible – nor even the loss of life, unfortunate as it was. The problem was that in every one of the incidents, some one million residents of the State of Israel were forced to sit in shelters, and schools and other educational institutions were closed by order of the Home Front Command, which meant that many people did not go to work because parents were forced to stay home with their children.

In addition to the economic damage, there was also damage to morale, as people felt helpless in the face of the attacks. The other side of the coin can be seen in the victory rally held by Islamic Jihad in Gaza in March 2012. From Islamic Jihad's point of view, this feeling among the Israeli public was itself a victory,<sup>16</sup> and the situation recurred at the end of Operation Pillar of Defense, which highlighted the fact that for Hamas, the victory was in its ability to persist in harming the civilian population in Israel

notwithstanding the IAF attacks. For this reason, the damage to Gush Dan was a significant achievement for Hamas.<sup>17</sup>

This problem is of course not unique to Iron Dome, and is characteristic of any defensive weapon system. Even if Israel had had twelve or twenty Iron Dome batteries, and even if hypothetically there had been a much better weapon system than Iron Dome, the situation in principle would not have been any different. In any rocket attack against Israel, it would still have been necessary to activate the sirens, the Home Front Command would still have needed to issue alerts and instruct Israelis when to enter protected spaces, and the economic damage, as well as the damage to morale, would have been the same.

This raises two difficult questions. First, how many Iron Dome batteries does the State of Israel need? According to Iron Dome's developers, the "defensive footprint" of a battery is about 100 square kilometers, while according to its opponents, it is much less. This is not a large area.<sup>18</sup> In order to protect the population of all Israeli towns and cities in a war with Lebanon, many dozens of batteries would be needed. Since the number of batteries purchased must be limited (and the number of interceptor missiles as well), the question of whom to protect and whom not to protect is critical.

Second, and this question stems directly from the previous question, is there any point at all in protecting the civilian population? With such an expensive defensive system, would it not be better to protect strategic facilities whose survival is important to the proper functioning of the country? This question becomes even sharper when we examine the procurement of the enemy, and in particular, Hizbollah. The missile systems in Hizbollah's possession are improving, not only in range and ability to cover ever-larger areas of the State of Israel, but especially in accuracy.<sup>19</sup> As long as the weapons in Hizbollah's possession have a statistical distribution, there is no point in using them against strategic facilities because there is little chance of causing them damage. It is better for Hizbollah to use missile systems as a weapon of terror against a civilian population. However, when the weapons are more accurate (and more expensive too, and therefore held in smaller quantities), the maximum benefit will be achieved by using them against such targets. Therefore, it appears preferable for the side that is defending itself to direct its resources toward protecting those facilities rather than the civilian population.

These considerations imply that investing in active defense systems for the civilian population is unnecessary. While the damage to property and people can be somewhat reduced, it is not possible to protect the entire population, or even a large part of it. More critically, it is not at all possible to prevent the real damage of rocket attacks, i.e., the damage to the country's economy and its ability to function properly. If money has already been invested in developing an anti-rocket defense system, it is better to use it in order to protect strategic facilities and not the population. Based on these considerations alone, the investment in Iron Dome appears superfluous. However, these of course are not the only considerations.

### **Deterrence**

An important argument in the decision to deploy a defensive system in general, and Iron Dome in particular, is its contribution to Israeli deterrence. Two main arguments are raised in this discussion. First, the success of the interceptions will make it clear to the enemy that firing rockets is pointless, and ultimately, it will stop. Yet even if we ignore for a moment the fact that such an argument is the antithesis of the entire classical theory of deterrence – which claims that deterrence is achieved through the threat of punishment, and not by preventing success<sup>20</sup> – it is hard to understand the argument, and even harder to assess its validity on the basis of cumulative experience. On the theoretical level, a party that fails in its use of offensive weapons may despair of further attempts to use them, but such a failure is also likely to encourage a search for solutions that can overcome defensive measures.

In practice, it is evident that the terrorist organizations in Gaza are not ignoring how Iron Dome affects their success, even when they themselves present the events as achievements and the success of Iron Dome as unimportant.<sup>21</sup> On the other hand, there are hints of the other side's efforts to find tactical solutions, evident from Iron Dome professionals who report on changes to the rockets' operating procedures made by the terrorist organizations in Gaza. These changes appear to have been an attempt to overcome defensive measures (apparently, by efforts to launch crowded salvos).<sup>22</sup>

Second is the argument made after Iron Dome's success in the latest rounds: the system gave decision makers freedom of action.<sup>23</sup> The implicit logic of this argument is that without Iron Dome's success, Israel would

have suffered much greater damage and decision makers would have found themselves forced to initiate an offensive campaign such as Operation Cast Lead. However, with the system's success, decision makers have a greater level of freedom to decide whether to attack or not, and when. This argument was especially prominent in commentaries published regarding Operation Pillar of Defense, which ended without a ground operation. The argument was made of course by those who believed that a ground attack in Gaza would not have been desirable.

This argument also has a flip side, which arose in discussions during Pillar of Defense and during the rounds of escalation that preceded it. It is the argument made by supporters of a ground operation, who claimed that Iron Dome has become a "fig leaf" for decision makers who from the outset did not want a ground operation.<sup>24</sup>

Both sides of this argument are problematic. Even in the past, Israel suffered rocket and missile attacks, and in the absence of any defensive option, Israel mainly used deterrent threats toward the enemy. However, Israel's leaders never felt that they lacked a degree of freedom to decide whether or not to attack the enemy, and when.<sup>25</sup> The claim that without one weapon system or another decision makers would have no discretion is an expression of no confidence in their ability to consider the issues and make rational decisions.

### Political Decisions

The third level of the analysis is the point of view of decision makers in the political echelon. Here there are completely different considerations.

The first consideration is the system's contribution to the morale of the civilian population, particularly in outlying areas, which in any case often feels neglected by the government. This sentiment is evident in videos uploaded to YouTube by Israeli citizens during the rounds of escalation in March and June 2012, as well as during Pillar of Defense. Not much can be seen in the videos: a bright spot in the sky hitting another spot, the flash of a small explosion in the distance. But in the background we can hear the cheers of those watching the successful interception. This can be seen more clearly in newspaper headlines during Operation Pillar of Defense.<sup>26</sup> The significance of this phenomenon is tremendous. Not only did Iron Dome contribute to the morale of the populace; it made an important contribution to the resilience of the civilian population overall. It proved to them that the IDF was doing everything it could to protect them.

Second, from the point of view of political decision makers, the moment there is any technical possibility of protecting the public from rocket attacks, it would be difficult to decide against purchasing such a system. A political leader in a democratic country would have great difficulty standing before the voting public and saying that the technology exists but he has decided not to purchase it. No matter how weighty the reasons, such a leader would have less chance of being reelected. The public would find it difficult to accept such a decision.

The operational echelons of the IDF learned this the hard way. As long as the Iron Dome system was in the development stage, there was no problem declaring that a civilian defense system was being developed. However, the moment the first system was delivered to the IDF, the operational consideration was activated, and the IDF came to the conclusion (the most reasonable one, as described above) that such a system would provide the maximum benefit in defending important strategic facilities, such as IDF bases, and the optimal use of the system would be to place it in a military base and deploy it outside the base when there was an operational need. The decision provoked immediate reactions and sharp protests from the public, particularly in areas that were under rocket threat. Very quickly, the political echelon was forced to order the IDF to deploy the system to protect civilian towns and cities.

Third is the aspect of Israel's technological and industrial base. Israel's security concept has always seen the defense industry as a very important component of the country's security. In order to preserve this base, the industry must receive orders from the defense establishment to maintain its ability to manufacture and support sales of weapon systems abroad. However, beyond the sale of products, it is important for the industry to be given technological challenges. In the past these challenges were large projects such as the Lavi fighter aircraft, the Arrow missile system, and many other systems. These challenges are the engine that drives industry to high levels of technology, and they are responsible for Israeli industry's current position as a world leader. From this point of view, even projects that were not ultimately carried out, such as the Lavi, made an immeasurable contribution to the advancement of the industry. (This point was also apparently behind the defense establishment's decision to prefer the Iron Dome system to competing systems produced abroad.)

The fourth consideration is the close relationship between Israel and the United States, one of the pillars of Israel's defense. Cooperation on issues of missile defense is a key component of this relationship because of the great importance of missile defense to US strategy. We can thus understand the cooperation in development and production of the Arrow and Magic Wand systems and the special allocations from the Obama administration, as part of its budget request to Congress, for grants for Israel to purchase additional Iron Dome batteries (allocations that are beyond the overall defense aid).

### Open Questions

Iron Dome has still not faced very difficult tests. An open question is what its real contribution would be in the event of a massive rocket attack from Lebanon. In the summer of 2006, in the course of one month, Israel was hit with 4,000 rockets. Today, Hizbollah's stores of weapons are much larger, estimated at 40,000-50,000 rockets. A possible scenario for fighting could include several thousand rockets fired every day. In such a scenario, there are several aspects of defense.

First is the question of what to protect and what not to protect. In this case, the question asked above will emerge in all its gravity: should Iron Dome be partially deployed in order to protect part of the civilian population part only to raise morale, or should the existing batteries be concentrated to defend those facilities whose survival would be critical to the functioning of the country?

Second is the question of the system's ability to be effective, even in protected areas. Even if a decision were made to defend certain civilian towns and cities (and certainly not all of them), would the system be effective? Would its ability to reduce the damage be such that it would even be felt in such a serious situation? And if the answer is negative, what would be the public's response to the damage it sustained, and would the system lose its value as a contribution to the morale and resilience of the population?

Third, the question that will always remain open for political discussion is "how much." The decision to purchase systems like Iron Dome was one decision. Decisions of an entirely different sort are how many batteries to purchase and what to defend. Will we defend ourselves to death?

In August 2012, the IDF spokesman announced that many of the year's recruits to combat units had expressed their desire to serve in Iron Dome units. This demonstrates the severity of the problem, since investment of resources in defense necessarily comes at the expense of resources for offensive capability. Even if a solution is found to the financial issue and additional money is found for defense, the human resources of the State of Israel remain as they were. Years ago, the most desirable units among recruits were the pilots' course, the paratroopers, and the reconnaissance units. The change is deep and fundamental. If in the past, Israel based its security on its offensive capabilities, today more and more of its resources and its power are being channeled to defense.

### Conclusion

Israel is the first country in the world to deploy an operational anti-rocket system to protect the civilian population. Very few countries in the world have suffered such severe attacks on their civilian populations for such an extended period. It is therefore no wonder that Israel has invested such extensive resources in the search for solutions to the problem.

The solution chosen was not without controversy. Opponents of the project pointed to several of the system's flaws: some are inherent in any system and others are unique to Iron Dome, which, like any technical system, suffers from one type of technical defect or another. Other opponents also pointed to the high cost of the system, arguing that there were better technological solutions.

The above analysis shows that decision making is a complex process that takes into account various types of considerations, the operational consideration being only one of them. Social, political, and even international considerations are no less and perhaps even more important. Given this range of considerations, the decision to purchase anti-rocket defense systems appears to be a wise one.

Apparently the diplomatic and political considerations, which were indifferent to the technical differences among the various systems, were the decisive factors in decision making. Therefore, any debate on the question of the technical alternatives – Iron Dome or any other possible system – is pointless.

The more difficult decision must be the decision to limit the amount of money invested in defensive capability in order not to harm the IDF's

offensive capability. This decision requires a thorough discussion of the relationship between defense and offense in general. The Iron Dome system is only the tip of the iceberg of this comprehensive discussion, which is well beyond the scope of this article.

### Notes

- 1 Rocket launchers were first used against Israel on September 16, 1968, when eight 130-mm rockets were shot from the direction of Jordan toward Beit Shean. Davar Correspondent, "For the First Time, Terrorists Use Heavy Weaponry during Shelling of Bet Shean," *Davar*, September 18, 1968, from [jpress.org.il](http://jpress.org.il), see [bit.ly/U2cTmq](http://bit.ly/U2cTmq).
- 2 This figure is taken from Rafael's web site, [www.rafael.co.il](http://www.rafael.co.il).
- 3 Yael Livnat and Yiftah Carmeli, "IAF Deploys Fifth Iron Dome Battery," IDF Spokesman, November 17, 2012, see [bit.ly/11wfOdD](http://bit.ly/11wfOdD).
- 4 Announcement by Defense Minister Barak as published by the IDF spokesman on August 21, 2012. See [bit.ly/11bICrC](http://bit.ly/11bICrC).
- 5 Item from *Jane's Defence Weekly*, September 2, 2009. This is also the number of batteries approved by the Foreign Affairs and Defense Committee in February 2011 (UPI, February 11, 2011). Defense Minister Barak repeated this number in his comments to the media during Operation Pillar of Defense. See *Haaretz*, ongoing updates during Operation Pillar of Defense, November 18, 2012.
- 6 Matan Hetzroni, "Iron Dome to be Upgraded at a Cost of 750 Million Shekels," Channel 2 Online News, November 20, 2012.
- 7 Yael Livnat, "One Year since Iron Dome's First Interception: Success is due to the Soldiers," IDF Spokesman, April 5, 2012, <http://bit.ly/Yo4uRS>.
- 8 These figures are from the Shin Bet's monthly reports, [www.shabak.gov.il](http://www.shabak.gov.il).
- 9 Livnat, "One Year since Iron Dome's First Interception."
- 10 "Summary of Operation Pillar of Defense," IDF Spokesman, November 21, 2012, see <http://bit.ly/10QRIKf>. According to my calculations, 479 rockets were aimed at built-up areas (421 of which were shot down and 58 of which scored a hit). The interception of 421 out of 479 rockets is a success rate of 87.8 percent. This is the success rate of the system and not of the individual interceptor missile. Although in a number of published videos the interceptor missiles are seen in pairs, we cannot conclude from this that two interceptors were fired at every rocket.
- 11 The fundamental criticism of anti-missile defense systems relies largely on the tremendous criticism of the American strategic anti-missile defense systems. In Israel, Dr. Reuven Pedatzur, who based himself on the works of Professor Theodore Postol of MIT, has been a particularly prominent critic. Since the early 1990s, Pedatzur has published many articles opposing development of the Arrow. He later criticized in a similar fashion the attempts to develop an anti-rocket defense system. In the late 1990s it was

the Nautilus system, and subsequently, Iron Dome. See Reuven Pedatzur, "The Arrow Project and Active Defense: Challenges and Questions," Memorandum No. 42 (Tel Aviv: Tel Aviv University, Jaffee Center for Strategic Studies, 1993). On Iron Dome, see Reuven Pedatzur, "Iron Dome is Impotent against the Qassam," *Haaretz*, February 21, 2008. Among those who criticize the system on the basis of technological considerations, particularly prominent are supporters of the Skyguard laser system, who have set up a non-profit organization called Home Front Shield for this purpose. The organization's website has a great deal of material on this topic. See <http://www.magenlaoref.org.il>. A third type of criticism has appeared in reports of the State Comptroller dealing with the procedural and financial side of the decision making process on development of the system.

- 12 While this paper was prepared for publication, a new series of critical articles were published challenging the data on the system's success rate. While a full answer to the criticism lies beyond the scope of this essay, see Yiftah Shapir, "How Many Rockets Did Iron Dome Shoot Down," *INSS Insight* No. 414, March 21, 2013, <http://www.inss.org.il/publications.php?cat=21&incat=&read=11166>.
- 13 See "Nautilus/Skyguard: A Response to the Claims of the Defense Ministry" on the Home Front Shield web site, <http://bit.ly/WBLjib>. By the way, a search of Northrop Grumman's website ([www.northropgrumman.com](http://www.northropgrumman.com)) no longer turns up any mention of the system (although Google still remembers the page that has information on it).
- 14 The Home Front Shield web site, <http://bit.ly/TD1JFS>. As noted, there are no official statistics on Iron Dome's minimum range.
- 15 Ibid.
- 16 See Amos Harel and Avi Issacharoff, "Israel's Wake-up Call," *Haaretz*, March 16, 2012, <http://bit.ly/whWYrn>.
- 17 Daniel Siroti, " Hamas Declares a Holiday," *Yisrael Hayom Newsletter*, November 22, 2012, <http://bit.ly/U9t6pX>.
- 18 Yaakov Katz, "IDF Postpones Final Tests of Iron Dome Defense System," *Jerusalem Post*, December 29, 2010. A simpler calculation shows that this is the area of a circle whose radius is about 5.6 kilometers. Note that the defensive footprint of anti-aircraft or anti-rocket missile systems is not necessarily circular. This information is given for illustrative purposes only.
- 19 Reuters/AP, "Nasrallah: With Accurate Missiles We Can Hit Hundreds of Thousands of Israelis," *Haaretz*, August 17, 2012, <http://bit.ly/NJY20>.
- 20 According to classical deterrence theory, defensive weaponry does not deter. This theory assumes that deterrence is achieved by the threat of weapons of mass destruction, a threat that if carried out cannot be acceptable to the deterred party. Nevertheless, the concept of deterrence has often been raised in discussions of defensive weapons as well. This occurred in Israel in discussions of the Arrow and Iron Dome, and abroad, in discussions of anti-missile defense systems. The theoretical discussion on deterrence

- by means of conventional weapons is in any case much more complex than the discussion of “classical” deterrence. See for example, Stephen L. Quackenbush, “National Missile Defense and Deterrence,” *Political Research Quarterly* 59, no. 4 (2006): 533–41.
- 21 See an unsigned article on the website of the Meir Amit Intelligence and Terrorism Information Center, “The War for Consciousness: Although the Latest Round of Fighting in Gaza has Ended with a Negative Balance for the Terrorist Organizations, They are Presenting it as a Victory,” March 22, 2012, <http://www.terrorism-info.org.il/he/article/17770>.
  - 22 One of the fascinating examples was a number of video clips uploaded to the internet during Operation Pillar of Defense showing the simultaneous interception of a large number of rockets over the skies of Beersheba. In my assessment, this shows that the terrorist organizations were attempting to defeat the system by launching a large number of rockets at the same time. On the other hand, the clip also shows the Iron Dome system’s capability. See, for example, Shay Malul, “Siren in Beersheba and Twelve Successful Interceptions,” <http://www.youtube.com/watch?v=8kAyqbKwd1o>. In this clip, at least fourteen Iron Dome interceptor missiles can be counted (the Grad rockets are not visible). Explosions from hits can also be counted, but it is impossible to know which of them were in fact interceptions and which were interceptor missiles self-destructing.
  - 23 This argument is made by Uzi Rubin, “‘Iron Dome’ vs. Grad Rockets: A Dress Rehearsal for an All-Out War,” BESA Center Perspectives Papers No. 173, July 3, 2012, <http://bit.ly/Q1OZMx>.
  - 24 As an example of an article supporting a ground operation, see Yori Yanover, “The Morally Reprehensible ‘Iron Dome’: Hamas’s Best Friend,” *Jewish Press*, November 19, 2012, <http://bit.ly/XwD1Oy>. As an example of an opposing article, see Ari Shavit, “Getting off the Pillar of Defense,” *Haaretz*, November 19, 2012, <http://bit.ly/ZZNm48>.
  - 25 This was the case during the difficult periods of the War of Attrition. See for example “Following Second Katyusha Bombardment against Kiryat Shmona, Serious Warnings to Lebanon by Prime Minister and Defense Minister,” *Davar*, May 12, 1970.
  - 26 See, for example, Anshel Pfeffer, “Those Who Rule the Roost: Behind the Scenes of Iron Dome,” *Haaretz*, November 23, 2012, <http://bit.ly/10oK9v5>. A further expression of the public’s feeling could be seen on social networking sites. Facebook pages were set up for Iron Dome and received thousands of “likes.” An interesting manifestation of the glorification of Iron Dome were the articles praising the decisions by Amir Peretz during his tenure as Minister of Defense. See for example Motti Bassok, “Who Was the First to Identify It? Thus Was Iron Dome Born,” *The Marker*, November 19, 2012, [bit.ly/Xr2jxy](http://bit.ly/Xr2jxy).