

# Hagai Bar-El

System Security Architect

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## Field of Activity

**System security: leadership, with the optimal technical substance.** Over 20 years of proven experience in the architecture of secure systems, Security Development Lifecycle (SDL/SDLC) deployment, system security evaluation, and management of security engineering and research teams, along with patent portfolios, as a C-level executive. Experience also covers evaluation of products and technologies for investment, evaluation of research proposals for the EU (FP7 and H2020 programs), standardization, and management of innovation processes and intellectual property, all in the fields of hardware, software, and system security.

## Work Experience

### Senior Director of Security, ISG division of *Arm*, 2015 to present

1. Direct professional and organizational management of the *Security Group* that carries out security analysis, threat modelling, definition of security controls, and security reviews of both system, hardware, and software.
2. Responsibility for the secure design and engineering of *ARM Pelion*<sup>®</sup>, the IoT service framework of Arm, its compliance with ISO 27001 and SOC2, its threat modelling, and its adherence to the risk appetite of the organization, reporting to Arm corporate Security Council.
3. Responsibility for both the definition and the day-to-day deployment of the *Security Development Lifecycle*.
4. Evaluation of security products, technologies, and intellectual property offered by startups for potential acquisition.

### Chief Technology Officer, *Discretix Technologies*, 2012–2015

Full CTO capacity, while also remaining the Chief Information Security Architect and the head of the CTO Office, as detailed below. This position was held until Discretix Technologies (later doing business as *Sansa Security*) was acquired by Arm and ceased to exist as an independent company, in August 2015.

### Chief Information Security Architect, *Discretix Technologies*, 2000–2015

1. Led the definition of new technologies for future products (2–5 year span), security IP, security requirements and reviews, for the entire lifetime of the company, until (and including) its acquisition by Arm.
2. Served as Chief Information Security Architect since the establishment of the company (as its very first hired employee, by the founders); as head of the CTO Office (the “Technology Group”) since July 2006; and as an official member of the company management, since September 2011.

3. Carried out or led the specification of the security schemes and protocols that were implemented into products, such as those at the core of the CryptoCell<sup>®</sup> CryptoFlash<sup>®</sup>, and Sansa Provisioning<sup>®</sup> product lines; mechanisms that facilitate: embedded secure storage, secure boot, code integrity, media content protection, automotive network firewalling, and IoT key provisioning; some are protected by patents.
4. Managed all innovation and intellectual property processes: evaluated new ideas for products and security enhancements, defined and enforced the patent filing strategy, drafted patent applications and defined patent claims, saw the intellectual property throughout the patent prosecution process, and managed the analysis of prior art and the interaction with IP service providers.
5. Held responsibility for porting system security knowledge into the company. This activity was extremely important, since Discretix was a security company that was entrusted by its customers to possess the most up-to-date knowledge in this domain.
6. Interacted with external labs that attested for the robustness of the products, such as by FIPS 140 and EMV certification programs, and represented the company and its technologies in standardization bodies such as the GlobalPlatform, MeT (Mobile Electronic Transactions), OMTP (Open Mobile Terminal Platform), OTAFF (Over The Air Flash Forum), OMA (Open Mobile Alliance), and IIC (Industrial Internet Consortium).

### **Independent System Security Architect, 1995 to present**

Self-employed (as sole proprietorship) architect in the field of system security. Engagements so far consisted primarily of:

- Design of secure systems, such as for an industrial firewall and IP TV.
- Evaluation of more than 100 research proposals over a decade, for the 7<sup>th</sup> Framework Program of the European Commission, in several calls addressing all areas related to security, as well as in its continuation program: H2020; including periodic review of an ongoing security research project.
- Evaluation of new and emerging technologies, e.g., for Venture Capital customers, prior to investment.

Clients consisted of major corporate players in the fields of telecommunication, banking, venture capital, defense, and technology, both in the public and in the private sectors.

### **Education**

**1994–1997** B.A. cum laude in Computer Science, from the Academic College of Tel-Aviv Jaffa.

**1996–2010** Attended several seminars, academic courses, and conferences, on information security, cyber security, cryptography, and intellectual property. Included are trade shows in Israel and abroad, and a “practical cryptography” course at the Weizmann Institute of Science.

**2008** Attended a course on Intellectual Property Management, in Lahav Institute, Israel.

### **Publications**

Publicly available papers are listed at: <https://www.hbareil.com/info/publications>.

A professional blog (active since 2005) is maintained at <https://www.hbareil.com>.

## Patents

Inventor (or co-inventor) of the following granted patents:

- In the field of embedded security:
  - US Patents 7,467,304; 7,934,049; 8,369,526; and 8,321,686
  - UK Patent 2,434,673
  - EU Patent 2,189,922
- In the field of IoT provisioning: US Patents 9,866,376; 8,687,813; 9,231,758; and 10,454,674
- In the fields of content protection and mobile security: US Patents 8,201,260; 9,344,275; and 10,491,379
- In the above fields, co-inventor of 3 additional granted patents in China, Japan, and Korea.

Inventor or co-inventor of 7 other non-abandoned US patent applications.