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Digimarc CORP  
Form 10-K  
February 22, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934  
For the fiscal year ended December 31, 2018

OR

Transition Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934  
For the transition period from \_\_\_\_\_ to \_\_\_\_\_

Commission File Number 001-34108

DIGIMARC CORPORATION

(Exact name of registrant as specified in its charter)

Oregon 26-2828185  
(State or other jurisdiction of (I.R.S. Employer  
incorporation or organization) Identification No.)

9405 SW Gemini Drive, Beaverton, Oregon 97008

(Address of principal executive offices) (Zip Code)

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(503) 469-4800

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, \$0.001 Par Value Per Share	The NASDAQ Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: NONE

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer

Non-accelerated filer Smaller reporting company  
Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the

Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes  No

The aggregate market value of common stock, par value \$0.001 per share, held by non-affiliates of the registrant, based on the closing price of our common stock on the Nasdaq Global Market on the last business day of the registrant's most recently completed fiscal second quarter (June 29, 2018), was approximately \$307 million. Shares of common stock beneficially held by each officer and director have been excluded from this computation because these persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for any other purposes.

As of February 18, 2019, 12,134,550 shares of the registrant's common stock were outstanding.

#### DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's proxy statement pursuant to Regulation 14A (the "Proxy Statement") for its 2019 annual meeting of shareholders are incorporated by reference into Items 10, 11, 12, 13 and 14 of Part III of this Annual Report on Form 10-K. The registrant intends to file the Proxy Statement not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

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Table of Contents

PART I

Item 1.	<u>Business</u>	1
Item 1A.	<u>Risk Factors</u>	6
Item 1B.	<u>Unresolved Staff Comments</u>	17
Item 2.	<u>Properties</u>	17
Item 3.	<u>Legal Proceedings</u>	18
Item 4.	<u>Mine Safety Disclosures</u>	18

PART II

Item 5.	<u>Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities</u>	19
Item 7.	<u>Management’s Discussion and Analysis of Financial Condition and Results of Operations</u>	20
Item 8.	<u>Financial Statements and Supplementary Data</u>	34
Item 9.	<u>Changes in and Disagreements with Accountants on Accounting and Financial Disclosure</u>	34
Item 9A.	<u>Controls and Procedures</u>	34
Item 9B.	<u>Other Information</u>	37

PART III

Item 10.	<u>Directors, Executive Officers and Corporate Governance</u>	38
Item 11.	<u>Executive Compensation</u>	38
Item 12.	<u>Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters</u>	38
Item 13.	<u>Certain Relationships and Related Transactions, and Director Independence</u>	38
Item 14.	<u>Principal Accountant Fees and Services</u>	38
Item 15.	<u>Exhibits and Financial Statement Schedules</u>	39

SIGNATURES



## PART I

Unless the context otherwise requires, references in this Annual Report on Form 10-K to “Company,” “Digimarc,” “we,” “our” and “us” refer to Digimarc Corporation.

All dollar amounts are in thousands except per share amounts or unless otherwise noted. The percentages within the tables may not sum to 100% due to rounding.

Digimarc, Digimarc Barcode, Digimarc Discover and Guardian are registered trademarks of Digimarc Corporation.

### ITEM 1: BUSINESS

The following discussion of Digimarc’s business contains forward-looking statements relating to future events or the future financial performance of Digimarc. Our actual results could differ materially from those anticipated in these forward-looking statements. Please see the discussion regarding forward-looking statements included in this Annual Report on Form 10-K in Item 7, Management’s Discussion and Analysis of Financial Condition and Results of Operations, under the caption “Forward-Looking Statements.”

The following discussion of our business should be read in conjunction with our consolidated financial statements and the related notes and other financial information appearing elsewhere in this Annual Report on Form 10-K.

#### Overview

Digimarc Corporation, an Oregon corporation incorporated in 2008, enables governments, banks, retailers, consumer brands and other businesses around the world to automatically and reliably identify and interact with virtually any form of media. We have pioneered the Digimarc Intuitive Computing Platform (ICP), a comprehensive set of technologies for identifying, discovering and interacting with digitally-enhanced media. The platform includes Digimarc Barcode, a proprietary method for imperceptibly enhancing packaging, print, images, thermal labels, audio and other objects with data that are detected by enabled devices, such as smart phones, computers, barcode scanners and machine-vision equipment. Digimarc Discover software enables an ecosystem of connected devices to easily identify content or materials and deliver information. Quality management tools, specifications, education and training resources support ICP and enable the growing ecosystem of alliances and developers to build a variety of applications including solutions that:

- Improve the speed of retail checkout;
- Provide simple and intuitive mobile customer engagement experiences in stores and at home;
- Improve inspection rates on manufacturing lines for quality control processes;
- Provide efficient and reliable identification of consumer packaged goods by retail associates in stores for inventory management and restocking;
- Quickly and reliably identify and effectively manage music, movies, television programming, digital images, e-publications, documents and other printed materials, especially in light of non-linear distribution over the Internet;
- Deter counterfeiting of money, media and goods, and piracy of e-publications, movies and music;
- Support new digital media distribution models and methods to monetize media content;
- Provide consumers with more choice and access to media content when, where and how they want it;
- Enhance imagery and video by associating metadata or authenticating media content for government and commercial uses; and
- Better secure identity documents to enhance national security and combat identity theft and fraud.

Our inventions allow our business partners and customers to provide persistent digital identities for virtually any media content that is digitally processed at some point during its lifecycle. Our technology can be applied to images, video, and audio to supply a wide range of consumer engagement, media management and security



solutions across multiple consumer and government industry sectors. Over the years our enabling software and business processes, and associated intellectual property portfolio, have grown to encompass many related technologies.

We provide our solutions directly and through our business partners. Our inventions provide a powerful element of document security, giving rise to a long-term relationship with a consortium of central banks (the “Central Banks”), and many leading companies in the information technology industry. We and our business partners have successfully propagated the use of our technology in music, movies, television broadcasts, digital images, e-publications and printed materials. Digimarc Barcodes have been used in these applications to improve media rights and asset management, reduce piracy and counterfeiting losses, improve marketing programs, permit more efficient and effective distribution of valuable media content and enhance consumer entertainment and commercial experiences.

Digimarc Barcodes can be used to enhance all forms of media and are generally imperceptible to human senses, but quickly detected by computers, networks or other digital devices like smartphones and tablets. Unlike traditional barcodes and tags, our solution does not require content owners to give up valuable visual space on their media content; nor does it impact the overall layout or aesthetics of their media content. Digimarc Barcodes are generally imperceptible in normal use and do all that visible barcodes do, but perform better. Our Digimarc Discover platform delivers a range of rich media experiences to its readers on their smartphones or tablets across multiple media formats, including print, audio, video and packaging. Unique to the Digimarc Discover platform is its seamless multi-modal use of various content identification technologies as needed, including Digimarc Barcode when present.

Banknote counterfeit deterrence was the first commercially successful large scale use of our technologies. Innovations based on our existing digital watermarking technology and experience have been leveraged to create new products to deter counterfeiting and tampering of driver licenses and other government-issued secure credentials. In parallel, our business partners, under patent or technology licenses from us, are delivering digital watermarking solutions to track and monitor the distribution of music, images, television and movies to consumers.

In November of 2007, we announced a relationship with The Nielsen Company (US) LLC (“Nielsen”) to license our patents in support of Nielsen’s industry leading television audience measurement solutions.

In October 2010, we entered into a patent licensing arrangement with IV Digital Multimedia Inventions, LLC, a Delaware limited liability company affiliated with Intellectual Ventures (“IV”), pursuant to which we granted an exclusive license to sublicense, subject to pre-existing encumbrances and a grant-back license, an aggregate of approximately 900 of the 1,200 patents and applications held by us at the time the agreement was entered into, as noted below in the section titled “Technology and Intellectual Property.” The number of patents and applications licensed to IV is now approximately 480. Through ongoing development, our portfolio that was not licensed to IV has grown to over 665 patents and applications.

In December 2012, we entered into a renewal and extension through 2024 of the Counterfeit Deterrence System Development and License Agreement with the Central Banks, with a 5-year extension option.

In January 2014, we introduced Digimarc Barcodes for use in consumer product packaging. These Digimarc Barcodes can contain the same or even more information found in traditional universal product codes (“UPC”). The UPC information is nearly imperceptible and repeated multiple times over the entire package surface making checkout faster and easier for both customers and cashiers. We partnered with Datalogic, a global leader in automatic data capture and industrial automation markets and producer of barcode readers, in introducing the Digimarc Barcode to the consumer product packaging market. Since then, additional scanner vendors and other alliance partners have announced support for Digimarc Barcode. Digimarc Barcodes can also connect mobile-enabled consumers directly from packaging to engaging mobile experiences such as additional product information, special offers,



recommendations, reviews, social networks and more.

In January 2016, Digimarc and GS1 US, the U.S. operation of the organization that maintains the global standards for barcodes, announced a broad collaboration to help the industries served by GS1 to make effective use of Digimarc Barcode. GS1 US educates, trains and provides access to services to their 300,000 member businesses. Among other things, Digimarc and GS1 US are working to improve product identification for retailers and consumers with brand-certified, accurate product information via Digimarc Barcodes. In September 2016, Digimarc announced a similar collaboration with GS1 Germany.

2

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In January 2018, we introduced Digimarc Barcode for use in thermal labels for fresh food products. These Digimarc Barcodes contain GS1 Application Identifiers for fresh foods, allowing retailers to dynamically adjust pricing on soon-to-be-expired fresh foods or sell items at a discount, instead of discarding them. Retail thermal labels with Digimarc Barcode scan even when ripped, creased, smudged or damaged, making checkout faster and easier for both customers and cashiers. We have partnered with multiple industry leading retail scale label manufacturers to introduce thermal labels enabled with Digimarc Barcode to the retail industry. Thermal labels enabled with Digimarc Barcode can also provide consumers an engaging mobile experience similar to Digimarc Barcode for consumer product packaging.

In April 2018, Digimarc announced a new 15-year partnership with Microsoft. The partnership includes the integration of Digimarc scanning software into Windows, as part of the Windows 10 update. The two companies have a history of working together to improve retailer operational efficiency and increase consumer engagement with products.

In May 2018, Digimarc announced its support of SmartLabel® and the availability of Digimarc Barcode scanning capabilities within the SmartLabel app. The SmartLabel program was developed by the Grocery Manufacturers Association (GMA) and the Food Marketing Institute (FMI) to give consumers a way to digitally access more detailed product information than could fit on a package. Most recently, Digimarc Barcode has been adopted by the U.S. Department of Agriculture as an approved digital disclosure method for products and packaging containing bioengineered food, commonly referred to as “GMOs.” The National Bioengineered Food Disclosure Standard was published in December 2018 after a review and comment period lasting more than two years. The regulations include provisions for label disclosure of food products containing genetically modified organisms, which went into effect on February 19, 2019. Consumer goods manufacturers and private label retailers can use Digimarc Barcode as a one-source solution to satisfy both their voluntary SmartLabel® program participation and mandatory bioengineering disclosures.

In October 2018, Digimarc previewed Signal Rich™ Art at Adobe Max. The Signal Rich art tools under development employ breakthrough advances in imaging science, machine vision and artificial intelligence to create artwork where machine-readable codes become native, inherent in, and inseparable from the design.

#### Customers and Business Partners

Our revenue is generated through commercial and government applications of our technology. We derive our revenue primarily from development services, subscriptions for products and services, and licensing of our technology and patents. During 2018, we generated the majority of our revenue from development services under a long-term contract with the Central Banks and from subscriptions for our products and related services.

In 2018, revenue from government contracts accounted for 66% of our total revenue. The Central Banks accounted for substantially all revenue generated under our government contracts. Our government contracts typically span one or more base years and multiple option periods. Government customers generally have the right to not exercise option periods. As part of our work with government customers, we must comply with and are affected by laws and regulations relating to the award, administration and performance of government contracts. Government contract laws and regulations affect how we do business with our government customers and, in some instances, impose added costs on our business.

Information about customers that accounted for 10% or more of revenue in the last two years is included in Note 3 of our Notes to Consolidated Financial Statements.

#### Products and Services

We provide media identification and management solutions to government and commercial customers and license our technology and patented inventions to solution providers. Our largest government customer is the Central Banks, with whom we have been developing, deploying, supporting and enhancing a system to deter digital counterfeiting of currency using personal computers and digital reprographics for the last 20 years. We sell our products and services to commercial customers for use in a wide range of applications providing for improved auto-identification of media. For instance, we provide solutions to the retail and consumer package goods industry that drive efficiency and reliability in product identification, and in the publishing industry we provide solutions that reduce piracy of books, images and other materials. We also license our technology and inventions to solution

providers who provide identification solutions to the media and entertainment industry. Many movie studios, record labels, broadcasters, creative professionals and other customers rely on our technology as a cost-effective means to:

- deter piracy and illegal use of movies, music, and other media;
- protect entertainment content from copyright infringement;
- track and monitor entertainment content for rights usage and licensing compliance;
- monitor advertisements to verify ad placement and measure return on investment;
- enhance information access, search and provide marketing capabilities related to media content; and
- enable authorized use of content by consumers.

The market for patent licensing has become more challenging in recent years. As a result, we have shifted our focus from direct monetization through enforcement and licensing to facilitating progress toward the realization of our vision to enrich everyday living via pervasive, intuitive computing by:

- encouraging large scale adoption of our technologies by industry leaders;
- increasing the scale and rate of growth of our products and services business; and
- laying a foundation for continuing innovation.

Our current patent licensees include, among others, AlpVision SA, IV, Kantar SAS, NexGuard Labs B.V., Nielsen, OverDrive, Inc., Signum Technologies, Teletrax B.V., Verance Corporation and Verimatrix, Inc.

#### Technology and Intellectual Property

We seek patent protection for our inventions to differentiate our products and technologies, mitigate infringement risks, and develop opportunities for licensing. Our broad patent portfolio covers a wide range of methods, applications, system architectures and processes.

Many of our patents relate to various methods for enhancing and reading digital information in packaging, images, video, and audio, whether the content is rendered in analog or digital formats. The digital information is generally embedded by making subtle modifications to the fundamental elements of the content itself, generally at a signal processing level. The changes necessary to apply this information are so subtle that they are generally not noticeable by people during normal use. Because the message is carried by the content itself, it is file-format independent. The embedded digital information generally survives most normal content transformations, including compression, edits, rotation, scaling, re-sampling, file-format transformations, copying, scanning and printing.

Our intellectual property contains many innovations in digital watermarking, content recognition (sometimes referred to as “fingerprinting”), digital rights management and related fields. To protect our inventions, we have implemented an extensive intellectual property protection program that relies on a combination of patent, copyright, trademark and trade secret laws, and nondisclosure agreements and other contracts. As a result, we believe we have one of the world’s most extensive patent portfolios in digital watermarking and related fields, with over 1,100 U.S. and foreign patents granted and applications pending as of December 31, 2018. We continue to develop and broaden our portfolio in the fields of media identification and management technology and related applications and systems. We devote significant resources to developing and protecting our inventions and continuously seek to identify and evaluate potential licensees for our patents. The patents in our portfolio each have a life of approximately 20 years from the effective filing date of the patent, and up to 17 years after the patent has been granted.

For a discussion of activities and costs related to our research and development in the last two years, please read “Research, development and engineering” under Part II, Item 7, “Management’s Discussion and Analysis of Financial

Condition and Results of Operations.”

Markets

Our patented inventions are used in various media identification and management products and solutions supporting a variety of media objects, from movies and music to banknotes, secure credentials and consumer packaged goods. Each media object enabled by our inventions creates the potential for several applications, such as:

• retail point of sale transaction processing;

4

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- track and trace of products within the supply chain;
- quality control in manufacturing processes;
- counterfeiting and piracy deterrence;
- online e-publication piracy protection;
- content identification and media management;
- authentication and monitoring;
- linking to networks and providing access to information; and
- enhanced services in support of mobile commerce.

We believe the market for most of these applications is in the early stages of development and that existing solutions represent only a small portion of the potential market for our products, services and technology.

### Competition

No single competitor or small number of competitors dominate our market. Our competitors vary depending on the application of our products and services. We generally compete with non-digital watermarking technologies for the security or marketing budgets of the producers and distributors of media objects, documents, products and advertising. These alternatives include, among other things, encryption-based security systems and technologies and solutions based on fingerprinting, pattern recognition, and traditional barcodes. Our competitive position in digital watermarking applications is strong because of our large, high-quality, sophisticated patent portfolio and our substantial and growing amount of intellectual property in related media security and management innovations that span basic technologies, applications, system designs and business processes. Our intellectual property portfolio allows us to use proprietary technologies that are well-regarded by our customers and partners, and not available to our competitors without a license. We compete based on the variety of features we offer and a traditional cost/benefit analysis against alternative technologies and solutions. We anticipate that our competitive position within some markets may be affected by factors such as reluctance to adopt new technologies and by changes in government regulations.

### Backlog

Based on projected commitments we have for the periods under contract with our respective customers, we anticipate our current contracts as of December 31, 2018 will generate a minimum of \$30 million in revenue, compared to \$28 million as of December 31, 2017. We expect approximately \$16 million of the \$30 million to be recognized as revenue during 2019.

Some factors that lead to increased backlog include:

- contracts with new customers;
- renewals with current customers;
- add-on orders with customers; and
- contracts with longer contractual periods replacing contracts with shorter contractual periods.

Some factors that lead to decreased backlog include:

- recognition of revenue associated with existing backlog;
- contracts with shorter contractual periods replacing contracts with longer contractual periods;
- modifications to existing contracts;
- contract minimum payments ending; and
- expiration of contracts with existing customers.

The mix of these factors, among others, dictates whether our backlog increases or decreases for any given period. Our backlog may not result in actual revenue in any particular period, because the orders, awards and



contracts included in our backlog may be subject to modification, cancellation or suspension. We may not realize revenue on certain contracts, orders or awards included in our backlog, or the timing of any realization may change.

## Employees

At December 31, 2018, we had 213 full-time employees, including 81 in sales, marketing, operations and customer support; 100 in research, development and engineering, including intellectual property; and 32 in finance, administration, information technology and legal.

Our employees are not covered by any collective bargaining agreement, and we have never experienced a work stoppage. We believe that our relations with our employees are good.

## Available Information

We make available free of charge through our website at [www.digimarc.com](http://www.digimarc.com) our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to these and other reports filed or furnished by us pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934 as soon as reasonably practicable after we file these materials with the Securities and Exchange Commission (the “SEC”).

## ITEM 1A: RISK FACTORS

Our business, financial condition, results of operations and cash flows may be affected by a number of factors. The following risk factors identify risks of which we are aware and that we consider to be material to our business. If any of the following risks and uncertainties develops into actual events, our business, financial condition, results of operations or cash flows could be materially adversely affected. In that case, the trading price of our common stock could decline.

### RISKS RELATED TO OUR BUSINESS

(1) As a purveyor of disruptive technology, if our channel partners and potential customers defer or delay adopting and implementing our technology, or if competitors or other market participants successfully engage in campaigns to discredit our technology, our revenues will be negatively affected.

While the Company’s legacy business remains strong, our primary sources of revenue growth—Digimarc Discover and Digimarc Barcode—are subject to the market forces and adoption curves common to other disruptive technologies. The market is in its early stages of development. Our revenue model anticipates annual subscriptions will be the primary source of our income. If widespread adoption of Digimarc Discover and Digimarc Barcode takes longer than anticipated, we will continue to experience operating losses.

We expect companies marketing competing technologies to compete vigorously in the marketplace, and to seek to preserve their market share. To the extent these companies succeed in defending their market position, our ability to achieve profitable operations will be impeded.

With respect to anticipated sales growth and prospects for our Digimarc Discover and Digimarc Barcode products and services, our three major avenues for revenue generation include direct sales, web sales, and channel partners. Our growing direct sales force is relatively new, with an average tenure of less than three years with the Company. The



redesign of our website to facilitate web-based sales is evolving. Most of our channel partners are relatively new to our products. Thus, the anticipated sources of revenue growth for Digimarc Discover and Digimarc Barcode are unproven. We are executing strategies intended to make each of these means of revenue generation more effective, but we provide no assurance that we will execute these strategies successfully.

(2) Our future growth will depend to a material extent on the successful advocacy of our technology by channel partners to their members and customers, and implementation of our technology in solutions propagated by channel partners and provided by third parties.

Our business has long relied on the success of business partners. Our continuing success is largely dependent on a new generation of business partners supporting Digimarc Discover and Digimarc Barcode. We have entered into agreements with numerous channel partners to propagate and support Digimarc Discover and Digimarc Barcode, including brand deployment and pre-media service providers Southern Graphics Systems, LLC, Schawk,

Inc., Sun Branding Solutions, and Diadeis, and consumer packaging solutions companies WestRock Company and Berry Plastics Group, Inc., all of which offer Digimarc Barcode services to national and store brand owners and consumer products suppliers; HP, Inc., who can perform large scale serialization of unique identifiers; Perrigo Company, the world's largest manufacturer of over-the-counter pharmaceutical products for the store brand market, to improve point-of-sale efficiency for retailers and provide consumers easier access to product information from enabled 'smart' labels; and platforms which provide unprecedented consumer engagement via smartphones, such as Shazam Entertainment Limited. Digimarc and GS1 US, the U.S. operation of the organization that maintains the global standards for barcodes, are collaborating to help the industries served by GS1 to make effective use of Digimarc Barcode. GS1 US educates, trains and provides access to services to their 300,000 member businesses. Among other things, Digimarc and GS1 US are working to improve product identification for retailers and consumers with brand-certified, accurate product information via Digimarc Barcodes. Digimarc has also entered into a similar collaboration with GS1 Germany. We provide no assurance that these collaborations will successfully generate revenue for our business.

If our channel partners are not successful in advocating and deploying our technology, we may not be able to achieve and sustain profitable operations. If other business partners who include our technology in their products or otherwise license our intellectual property for use in their products cease to do so, or we fail to successfully collaborate with third parties or to obtain other partners who will incorporate, embed, integrate or bundle our technology, or these partners are unsuccessful in their efforts, expanding deployment of our technology will be adversely affected. Consequently, our ability to increase revenue could be adversely affected and we may suffer other adverse effects to our business. In addition, if our technology does not perform according to market expectations, our future sales would suffer as customers seek and employ alternative technologies.

(3) If leading companies in the retail and consumer products industries or standard-setting bodies or institutions downplay, minimize or reject the use of our technology, our product deployment may be slowed and we may be unable to achieve profitable operations.

Many of our business endeavors, including the Digimarc Barcode, can be impeded or frustrated by larger, more influential companies or by standard-setting bodies or institutions downplaying, minimizing or rejecting the value or use of our technology. A negative position by such companies, bodies or institutions could result in obstacles for us that we would be incapable of overcoming and may block or impede the adoption of our technology. In addition, potential customers may delay or reject initiatives that relate to deployment of our technology. Such developments would make the achievement of our business objectives in this market difficult or impossible.

(4) We are subject to risks encountered by companies developing and relying upon new technologies, products and services to achieve and sustain profitable operations.

Our business and prospects must be considered in light of the risks and uncertainties to which companies with new and rapidly evolving technology, products and services are exposed. These risks include the following:

- we may be unable to develop sources of new revenue or sustainable growth in revenue because our current and anticipated technologies, products and services may be inadequate or may be unable to attract or retain customers;
- intense competition from existing and new technologies and rapid technological change could adversely affect the market's acceptance of our existing and new products and services;
- we may be unable to develop and maintain new technologies upon which our existing and new products and services are dependent, which may cause our products and services to be less sustainable and competitive or which could make it harder for us to expand our revenue and business; and
- our licensees may not be able to successfully enter new markets or grow their businesses, limiting royalties paid to us.

Some key technologies and solutions of our patent or technology licensees are in the development stage. Consequently, products incorporating our technology and solutions are undergoing technological change and are in the early stages of introduction in the marketplace. Delays in the adoption of these products or adverse competitive developments may result in delays in the development of new revenue sources or the growth in our existing revenue streams. We may be required to incur unanticipated expenditures if product changes or improvements are required. Moreover, new industry standards might redefine the products that we or our licensees are able to sell, especially if these products are only in the prototype stage of development. If product changes or improvements are required,

7

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success in marketing these products by us or our licensees and achieving or sustaining profitability from these products could be delayed or halted.

(5) A significant portion of our current and potential future revenue is subject to commercial and government contracts and development of new markets that may involve unpredictable delays and other unexpected changes. Such volatility and uncertainty might limit our actual revenue in any given quarter or year.

We derive a significant portion of our revenue from contracts tied to development schedules or development of new markets, which could shift for months, quarters or years as the needs of our customers and the markets in which they participate change. Government agencies and commercial customers also face budget pressures that introduce added uncertainty. Any shift in development schedules, the markets in which we or our licensees participate, or customer procurement processes, which are outside our control and may not be predictable, could result in delays in bookings/revenues forecasted for any particular period, could affect the predictability of our quarterly and annual results, and might limit our actual revenue recognized in any given quarter or year, resulting in reduced and less predictable revenue and adversely affecting profitability.

We are expanding into new markets, which involve inherent risk and unpredictability. With the proliferation of smartphones and increased consumer demands for product information, we have investigated other technologies that may provide attractive future opportunities. These generally include technologies that leverage our strength in signal processing and support our vision for intuitive, pervasive computing. As we seek to expand outside our areas of historical expertise, we lack the history and insight that benefited us in the watermarking field. Although we have extensive experience in the commercial application of digital watermarking, we are investing in but may not be as well-positioned in these other opportunities. Accordingly, it may be difficult for us to achieve success in other technologies we might pursue.

(6) A small number of customers account for a substantial portion of our revenue, and the loss of any large contract could materially disrupt our business.

Historically, we have derived a significant portion of our revenue from a limited number of customers. Five customers represented approximately 74% of our revenue for the year ended December 31, 2018. Most of our revenue comes from our contract with the Central Banks, which expires in 2024 with the possibility of a five-year extension. Other contracts we enter into may contain termination for convenience provisions. If we were to lose any such contract for any reason, or if our relationship with these customers or the Central Banks were materially modified, our financial results would be adversely affected.

We expect to continue to depend upon a small number of customers for a significant portion of our revenue for the foreseeable future. The loss of, or decline in, orders or backlog from one or more major customers could reduce our revenue and have a material adverse effect on our financial results.

(7) We were not profitable in 2017 or 2018 and may not be able to return to or sustain profitability in the future, particularly if we were to lose large contracts or fail in our new market development initiatives. Sustained lack of profitability could cause us to incur asset impairment charges for long-lived assets and/or record valuation allowance against our deferred tax assets.

We incurred net losses in 2017 and 2018 largely due to increased levels of investments in our business to support product development and sales growth initiatives.

Returning to and maintaining profitability in the future will depend upon a variety of factors, including our ability to maintain and obtain more significant partnerships like we have with the Central Banks, and to acquire new customers

for Digimarc Discover, Digimarc Barcode and Digimarc Guardian. Profitability will also depend on our efficiency in executing our business strategy and capitalizing on new opportunities. Various adverse developments, including the loss of large contracts or cost overruns on our existing contracts, could adversely affect our revenue, margins and profitability.

If we continue to incur operating losses, an impairment to the carrying value of our long-lived assets, including goodwill, acquired intangible assets, patent assets and property and equipment could result. We test for impairment of our long-lived assets when a triggering event occurs that would indicate that the carrying value may not be recoverable. Our methodology for assessing impairment may require management to make judgments and assumptions regarding future cash flows. Our projections of future cash flows are largely based on historical

experience, and these projections may not be achieved. Changes to these financial projections used in our impairment analysis could lead to an impairment of all or a portion of our long-lived assets. Any such impairment charge could adversely affect our results of operations and our stock price. We evaluated our long-lived assets for impairment as of December 31, 2018 and 2017 and concluded there was no impairment for either period. We cannot guarantee, however, that our long-lived assets will not become impaired in the future.

We record valuation allowances on our deferred tax assets if, based on available evidence, it is more-likely-than-not that all or some portion of the assets will not be realized. The determination of whether our deferred tax assets are realizable requires management to identify and weigh all available positive and negative evidence. Management considers recent financial performance, projected future taxable income, scheduled reversals of deferred tax liabilities, tax planning strategies and other evidence in assessing the realizability of our deferred tax assets. Adjustments to our deferred tax assets could adversely affect our results of operations and our stock price. In 2014, we recorded a full valuation allowance against our deferred tax assets largely due to the cumulative loss we had incurred over the previous three years, which is considered a significant piece of negative evidence in assessing the realizability of deferred tax assets. As of December 31, 2018 and 2017, we determined a full valuation allowance was still appropriate given continued losses. We will not record tax benefits on any future losses until it is determined that those tax benefits will be realized.

(8) We may be adversely affected by variability of contracted arrangements.

We periodically agree to modify the terms of contractual arrangements with our customers, partners and licensees in response to changes in circumstances underlying the original contractual arrangements, and it is likely that we will do so in the future. As a result of this practice, the terms of our contractual arrangements with our customers, partners and licensees may vary over time and, depending on the particular modification, could have a material adverse effect on our financial position, results of operations or cash flows.

Some of our customers and licensees report royalties to us based on their revenue and their interpretation and allocation of contracted royalty obligations. It is possible that we may not agree with the judgments of our customers on such matters, and such disagreement may lead to potential disputes and reduced revenue to us. These disputes could result in a distraction to our management and may not result in increased revenues to us but may nevertheless result in friction between us and our customers, and potentially the loss of customers, which may ultimately be harmful to our business.

(9) The market for our products is highly competitive, and alternative technologies or larger companies that compete with us may be more successful than us in gaining market share, which would decrease our revenue and profits.

The markets in which we compete for business are intensely competitive and rapidly evolving. We expect competition to continue from both existing competitors and new market entrants. We face competition from other companies and from alternative technologies, including some of our customers and licensees. We also may face competition from unexpected sources.

Alternative technologies that may directly or indirectly compete with particular applications of our watermarking technologies include:

- Traditional anti-counterfeiting technologies—a number of solutions used by many government agencies (that compete for budgetary outlays) designed to deter counterfeiting, including optically sensitive ink, magnetic threads and other materials used in the printing of currencies;
- Object and image recognition—one or several pre-specified or learned objects or object classes that can be recognized, usually together with their two-dimensional positions in the image or three-dimensional poses in the scene;

Radio frequency tags—embedding a chip that emits a signal when in close proximity with a receiver, used in some photo identification credentials, labels and tags;

Internet technologies—numerous existing and potential Internet access and search methods are competitive with Digimarc mobile systems and the searching capabilities of Digimarc Guardian;

9

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• Digital fingerprints and signatures—a metric, or metrics, computed solely from a source image or audio or video track, that can be used to identify an image or track, or authenticate the image or track; and

• Barcodes or QR codes—data-carrying codes, typically visible in nature (but may be invisible if printed in ultraviolet- or infrared-responsive inks).

In the competitive environments in which we operate, product generation, development and marketing processes relating to technology are uncertain and complex, and require accurate prediction of demand as well as successful management of various risks inherent in technology development. In light of these uncertainties, it is possible that our failure to successfully accommodate future changes in technologies related to our technology could have a long-term negative effect on our growth and results of operations.

As we work to achieve market acceptance of our products and services, new developments are expected to continue, and discoveries by others, including current and potential competitors, could render our services and products uncompetitive. Moreover, because of rapid technological changes, we may be required to expend greater amounts of time and money than anticipated to develop new products and services, which in turn may require greater revenue streams from those products and services to cover developmental costs. Many of the companies that compete with us for some of our business, as well as other companies with whom we may compete in the future, are larger and may have stronger brand recognition and greater technical, financial, marketing and political resources than we do. These attributes could enable these companies to have more success in the market than we have, either by providing better products or better pricing than we can provide. We may be unable to compete successfully against current or future participants in our market or against alternative technologies, and the competitive pressures we face may have a materially adverse effect on our financial position, results of operations or cash flows.

(10) An increase in our operations outside of the U.S. subjects us to risks additional to those to which we are exposed in our domestic operations.

We believe that revenue from sales of products and services to commercial, governmental and other customers outside the U.S. could represent a growing percentage of our total revenue in the future. Digimarc Discover is not bounded geographically, and we believe Digimarc Barcode will see global deployment. As such, certain contracts may be made and performed, in whole or in part, outside of the U.S. Similarly, for Digimarc Guardian, we perform certain functions in various jurisdictions outside of the U.S. International operations are subject to a number of risks that can adversely affect our sales of products and services to customers outside of the U.S., or expose us to additional expense or liabilities, including the following:

- difficulties and costs of staffing, developing and managing foreign operations as a result of distance, language and cultural differences;
- the effect of laws governing our business, employee and contractor relationships, and the existence of workers' councils and labor unions in some jurisdictions;
- changes in foreign government regulations and security requirements;
- export license requirements, tariffs, retaliatory trade measures and domestic or foreign taxes;
- trade barriers;
- difficulty in protecting intellectual property;
- longer payment cycles than those for customers in the U.S.;
- difficulty in collecting accounts receivable;
- currency fluctuations; and
- political and economic uncertainty or instability.

We do not have an extensive operational infrastructure for international business. We generally depend on local or international business partners and subcontractors for performance of substantial portions of our business. If we fail to comply with the many international laws and regulations to which we may be subject, we may be subject to significant fines, penalties or liabilities for noncompliance. These factors may result in greater risk of performance



problems or of reduced profitability with respect to our international programs in these markets. In addition, if foreign customers, in particular foreign government authorities, terminate or delay the implementation of our products and services, it may be difficult for us, or we may not be able, to recover our potential losses.

(11) We depend on our management and key employees for our future success. If we are not able to retain, hire or integrate these employees, we may not be able to meet our commitments.

Our success depends to a significant extent on the performance and continued service of our management and our intellectual property team. The loss of the services of any of these employees could limit our growth or undermine customer relationships.

Due to the high level of technical expertise that our industry requires, our ability to successfully develop, market, sell, license and support our products, services, and intellectual property depends to a significant degree upon the continued contributions of our key personnel in engineering, sales, marketing, operations, legal and licensing, many of whom would be difficult to replace. We believe our future success will depend in large part upon our ability to retain our current key employees and our ability to attract, integrate and retain new personnel in the future. It may not be practical for us to match the compensation some of our employees could be offered by other employers. In addition, we may encounter difficulties in hiring and retaining employees because of concerns related to our financial performance or operating results. These circumstances may have a negative effect on the market price of our common stock, and employees and prospective employees may factor in the uncertainties relating to our stability and the value of any equity-based incentives in their decisions regarding employment opportunities and decide to leave our employ or decline employment offers. Moreover, our business is based in large part on patented technology, that is a unique and sophisticated signal processing technology. New employees require substantial training, involving significant resources and management attention. Competition for experienced personnel in our business can be intense. If we do not succeed in attracting new, qualified personnel or in integrating, retaining and motivating our current personnel, our growth and ability to deliver products and services that our customers require may be hampered. Although our employees generally have executed agreements containing non-competition clauses, we do not assure you that a court would enforce all of the terms of these clauses or the agreements generally. If these clauses were not fully enforced, our employees could freely join our competitors. Although we generally attempt to control access to and distribution of our proprietary information by our employees, we do not assure you that the confidential nature of our proprietary information will be maintained in the course of such future employment. Any of these events could have a material adverse effect on our financial position, results of operations or cash flows.

(12) We may acquire or invest in other companies or technologies in the future, which could divert management's attention, result in additional dilution to our stockholders, increase expenses, disrupt our operations and harm our operating results.

We acquired Attributor Corporation ("Attributor") in December 2012, and we may in the future acquire or invest in businesses, products or technologies that we believe could complement or expand our current product and service offerings, enhance our technical capabilities, expand our operations into new markets or otherwise offer growth opportunities. The pursuit of potential acquisitions or other strategic transactions may divert the attention of management and cause us to incur various expenses related to identifying, investigating and pursuing suitable acquisitions or strategic transactions, whether or not they are consummated.

There are inherent risks in integrating and managing acquisitions. We may not be able to assimilate or integrate the acquired personnel, operations and technologies successfully or effectively manage the combined business following an acquisition. We also may not achieve the anticipated benefits from an acquired business due to a number of factors, including:

- unanticipated costs or liabilities associated with the acquisition;
- incurrence of acquisition-related costs;
- inability to generate sufficient revenue to offset acquisition or investment costs;
- the inability to maintain relationships with customers and partners of the acquired business;

- the need to implement additional controls, procedures and policies;
- entry into geographic markets in which we have little or no prior experience, and challenges caused by distance, language and cultural differences;
- differences in foreign labor and employment laws, including classification of employees and contractors;
- disruption of our ongoing business;

11

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- the potential loss of key employees; and
- use of substantial portions of our available cash to consummate the acquisition.

Acquisitions could also result in dilutive issuances of equity securities or the incurrence of debt, which could adversely affect our financial position. In addition, if an acquired business fails to meet our expectations, our operating results, business and financial condition may suffer.

(13) (a) We may not be able to adequately secure patent or other protection for our technologies.

Our business depends in part on securing protection for our proprietary technology and successfully licensing our technology to third parties. To protect our intellectual property portfolio, we rely on a combination of patent, copyright, trademark and trade secret rights, confidentiality procedures and licensing arrangements. Although we regularly apply for patents to protect our intellectual property, there is no guarantee that we will secure patent protection for any particular technology we develop.

Changes in the U.S. and foreign patent laws, or in the interpretation of existing laws, may adversely affect our ability to secure or enforce patents. For example, the U.S. Supreme Court issued a decision in 2014 limiting patent eligibility of computer implemented inventions. The Leahy-Smith America Invents Act of 2011 (the “America Invents Act”) also codifies several changes to the U.S. patent laws, including the creation of a post-grant inter partes review process to challenge patents after they have issued. The America Invents Act allows third parties to petition the U.S. Patent and Trademark Office or comparable government authorities in other jurisdictions to review and reconsider the patentability of any of our inventions claimed in our issued patents. Any such proceeding may result in one or more of our patent claims becoming limited, or being invalidated altogether. Additionally, certain foreign jurisdictions may not recognize or enforce our patents in those jurisdictions. A limitation or invalidation of our patent claims could adversely affect our financial position and our operating results.

Patents have finite lives, and our ability to continue to commercially exploit our patents is limited to the term of the patents. Our earliest patents began expiring in July 2012, and the patents in our portfolio expire at various times between 2019 and 2038. The size and strength of our portfolio depends on the number of patents that have been granted, offset by the number of patents that expire, in any given year. We continue to develop our patent portfolio, but we do not assure you that we will be able to exploit newer patents to the extent that we have exploited our earlier patents.

As part of our confidentiality procedures, we generally enter into non-disclosure agreements with our employees, directors, consultants and corporate partners, and attempt to control access to and distribution of our technology, solutions, documentation and other proprietary information. Despite these procedures, third parties could copy or otherwise obtain and make unauthorized use of our technology, solutions or other proprietary information or independently develop similar technologies, solutions or information. The steps that we have taken to prevent misappropriation of our solutions, technology or other proprietary information may not succeed.

We do not assure you that the protection of our proprietary rights will be adequate or that our competitors will not independently develop similar technologies, duplicate our services or design around any of our patents or other intellectual property rights.

(b) We may not be successful in enforcing our intellectual property rights against third parties.

Unlicensed copying and use of our intellectual property or infringement of our intellectual property rights may result in the loss of revenue to us and cause us other harm. If we encounter a company that we believe is infringing our intellectual property rights, we may try to negotiate a license arrangement with such party. If we try and are unable to negotiate a license or secure the agreement of such alleged infringing party to cease its activities, we must make

decisions as to how best to enforce our intellectual property rights, which may result in additional costs.

The process of negotiating a license with a third party can be lengthy, and may take months or even years in some circumstances. It is possible that third parties who we believe are infringing our intellectual property rights are unwilling to license our intellectual property from us on terms we can accept, or at all.

If we cannot persuade a third party who we believe is infringing our technology to enter into a license with us, we may be required to consider other alternatives to enforce our rights, including commencing litigation. The

decision to commence litigation over infringement of a patent is complex and may lead to several risks to us, including the following, among others:

- the time, significant expense and distraction to management of managing such litigation;
  - the uncertainty of litigation and its potential outcomes;
  - the possibility that in the course of such litigation, the defendant may challenge the validity of our patents, which could result in a re-examination or post grant review of our patents and the possibility that the claims in our patents may be limited in scope or invalidated altogether;
  - the potential that the defendant may successfully persuade a court that their technology or products do not infringe our intellectual property rights;
  - the impact of such litigation on other licensing relationships we have or seek to establish, including the timing of renewing or entering into such relationships, as applicable, as well as the terms of such relationships; and
  - adverse publicity to us or harm to relationships we have with customers or others.
- Also, enforcement of patent protection throughout the world is generally established on a country-by-country basis and we may not be able to enforce our patents in foreign jurisdictions.

If we fail to protect our intellectual property rights adequately, if there are adverse changes in applicable laws, or if we become involved in litigation relating to our intellectual property rights or the intellectual property rights of others, our business could be seriously harmed. In such cases, the value ascribed to our intellectual property could diminish, we may incur significant legal expenses that could harm our results of operations and our patents or other intellectual property rights may be limited or invalidated. Any of the foregoing could have a negative effect on the value of our common stock.

(c) We may be subject to infringement claims and other litigation, which could adversely affect our business.

As more companies engage in business activities relating to digital watermarking, and develop corresponding intellectual property rights, it is increasingly likely that claims may arise which assert that some of our products or services infringe upon other parties' intellectual property rights. These claims could subject us to costly litigation and divert management resources. These claims may require us to pay significant damages, cease production of infringing products, terminate our use of infringing technology or develop non-infringing technologies. In these circumstances, continued use of our technology may require that we acquire licenses to the intellectual property that is the subject of the alleged infringement, and we might not be able to obtain these licenses on commercially reasonable terms or at all. Our use of protected technology may result in liability that threatens our continuing operation.

Some of our contracts include indemnity and similar provisions regarding our non-infringement of third-party intellectual property rights. As deployment of our technology increases, and more companies enter our markets, the likelihood of a third party lawsuit resulting from these provisions increases. If an infringement arose in a context governed by such a contract, we may have to refund to our customer amounts already paid to us or pay significant damages, or we may be sued by the party whose intellectual property has allegedly been infringed upon.

(14) If our revenue models and pricing structures relating to products and services that are under development do not gain market acceptance, the products and services may fail to attract or retain customers and we may not be able to generate new revenue or sustain existing revenue.

Some of our business involves embedding digital watermarks in traditional and digital media, including consumer product packaging and related marketing materials, secure documents, audio, video and imagery, and licensing our intellectual property. Our revenues result from a combination of development, consulting, subscription and license fees from a variety of media identification and management applications. We have not fully developed our revenue

models for some applications related to Digimarc Discover and Discover Barcode. Because some of our products and services are not yet well-established in the marketplace, and because some of these products and services will not directly displace existing solutions, we cannot be certain that the pricing structure for these products and services will gain market acceptance or be sustainable over time or that the marketing for these products and services will be effective.

(15) If we are unable to respond to regulatory or industry standards effectively, or if we are unable to develop and integrate new technologies effectively, our growth and the development of our products and services could be delayed or limited.

Our future success will depend in part on our ability to enhance and improve the responsiveness, functionality and features of our products and services, and those of our business partners, in accordance with regulatory or industry standards. Our ability to remain competitive will depend in part on our ability to influence and respond to emerging industry and governmental standards in a timely and cost-effective manner. If we are unable to influence these or other standards or respond to these standards effectively, our growth and the development of various products and services could be delayed or limited.

Our market is characterized by new and evolving technologies. The success of our business will depend on our ability to develop and integrate new technologies effectively and address the increasingly sophisticated technological needs of our customers in a timely and cost-effective manner. Our ability to compete in our markets will depend in part on our ability to:

- enhance and improve the responsiveness, functionality and other features of the products and services we offer or plan to offer;
- continue to develop our technical expertise; and
- develop and introduce new services, applications and technologies to meet changing customer needs and preferences and to integrate new technologies.

We do not assure you that we will be successful in responding to these technological and industry challenges in a timely and cost-effective manner. If we are unable to develop or integrate new technologies effectively or respond to these changing needs, our margins could decrease, and our release of new products and services and the deployment of our technology could be adversely affected.

(16) We may need to retain additional employees or contract labor in the future in order to take advantage of new business opportunities arising from increased demand, which could increase costs and impede our ability to achieve or sustain profitability in the short term.

We have staffed our company with the intent of accelerating our product development and sales growth initiatives while also focusing on achieving and sustaining profitability. Our current staffing levels could affect our ability to respond to increased demand for our services. In addition, to meet any increased demand and take advantage of new business opportunities in the future, we may need to increase our workforce through additional employees or contract labor. Although we believe that increasing our workforce would potentially support anticipated growth and profitability, it would increase our costs. If we experience such an increase in costs, we may not succeed in achieving or sustaining profitability in the short term.

(17) The terms and conditions of our contracts could subject us to damages, losses and other expenses if we fail to meet delivery and other performance requirements.

Our service contracts typically include provisions imposing:

- development, delivery and installation schedules;
- customer acceptance and testing requirements; and
- other performance requirements.

To the extent these provisions involve performance over extended periods of time, risks of noncompliance may increase. From time to time we have experienced delays in system implementation, timely acceptance of programs, concerns regarding program performance and other contractual disputes. If we fail to meet contractual performance



requirements as promised, or to successfully resolve customer disputes, we could incur liability for damages, as well as increased costs, lower margins, or compensatory obligations in addition to other losses, such as harm to our reputation. Any unexpected increases in costs to meet our contractual obligations or any other requirements necessary to address claims and damages with regard to our customer contracts could have a material adverse effect on our business and financial results.

(18) Products deploying our technology could have unknown defects or errors, which may give rise to claims against us, divert application of our resources from other purposes or increase our project implementation and support costs.

Products and services as complex as those we offer or develop may contain undetected defects or errors. Furthermore, we often provide complex implementation, integration, customization, consulting and other technical services in connection with the implementation and ongoing maintenance of our products. Despite testing, defects or errors in our products and services may occur, which could result in delays in the development and implementation of products and systems, inability to meet customer requirements or expectations in a timely manner, loss of revenue or market share, increased implementation and support costs, failure to achieve market acceptance, diversion of development resources, injury to our reputation, increased insurance costs, increased service and warranty costs and warranty or breach of contract claims. Although we attempt to reduce the risk of losses resulting from warranty or breach of contract claims through warranty disclaimers and liability limitation clauses in our sales agreements when we can, these contractual provisions are sometimes limited and may not be enforceable in every instance. If a court refuses to enforce the liability limiting provisions of our contracts for any reason, or if liabilities arise that were not contractually limited or adequately covered by insurance, the expense associated with defending these actions or paying the resultant claims could be significant.

(19) The security systems used in our business and our product and service offerings may be circumvented or sabotaged by third parties, which could result in the disclosure of sensitive information or private personal information or cause other business interruptions that could damage our reputation and disrupt our business.

Our business relies on computers and other information technologies, both internal and at customer locations. The protective measures that we use may not prevent all security breaches, and failure to prevent security breaches may disrupt our business, damage our reputation, and expose us to litigation and liability. A party who is able to circumvent security measures could misappropriate sensitive or proprietary information or materials or cause interruptions or otherwise damage our products, services and reputation, and the property of our customers. If unintended parties obtain sensitive data and information, or create bugs or viruses or otherwise sabotage the functionality of our systems, we may receive negative publicity, incur liability to our customers or lose the confidence of our customers, any of which may cause the termination or modification of our contracts. Further, our insurance coverage may be insufficient to cover losses and liabilities that may result from these events.

In addition, we may be required to expend significant capital and other resources to protect ourselves against the threat of security breaches or to alleviate problems caused by these breaches. Any protection or remedial measures may not be available at a reasonable price or at all, or may not be entirely effective if commenced.

(20) We may experience outages and disruptions of our infrastructure that may harm our business, prospects, financial condition and results of operations.

We may be subject to outages or disruptions of our infrastructure, including information technology system failures and network disruptions. Substantially all of our owned computer and communications hardware is located at a single facility. We also use third-party cloud service providers, which are also susceptible to outages and disruptions. System redundancy may be ineffective or inadequate, and our disaster recovery planning may not be sufficient for all eventualities.

If a natural disaster, cyber incident, weather event, power disruption, telecommunications failure, act of terrorism or other event occurred that prevented us from using all or a significant portion of our facility and/or damaged critical infrastructure, it could harm our ability to conduct normal business operations.

(21) We are periodically involved in the ordinary course of business in litigation, and an adverse resolution of such litigation may adversely affect our business, financial condition, results of operations, and cash flows.

From time to time, in our normal course of business, we are a party to various legal claims, actions and complaints. For example, as part of our patent licensing program, we may bring claims or counterclaims of patent infringement to enforce our patent rights. Given the uncertain nature of litigation, we are not able to estimate the amount or range of gain or loss that could result from an outcome of litigation. Litigation can be expensive, lengthy, and disruptive to normal business operations. The results of complex legal proceedings are often uncertain and difficult to predict. We could incur costs in excess of any established accruals and, to the extent available, excess liability insurance. An unfavorable outcome in any legal proceedings could have a material adverse effect on our business, financial condition, results of operations, and cash flows.

(22) Consolidation of consumer product companies and/or retailers, or other concentration of market share among a few consumer products companies and/or retailers, may reduce the number of potential customers for our technology and put pressure on our pricing structure.

The consumer products and retailer markets in some geographic regions are dominated by a few large companies. These companies have in the past increased their market share and may continue to do so in the future by expanding through acquisitions. In the future, if significant acquisitions were to occur there may be fewer potential customers for our technology. Additionally, larger companies have strengthened purchasing power, which could force a decline in our pricing structure and decrease the margins we can realize.

(23) Data breaches and cyber-attacks or cyber-fraud could compromise our intellectual property or other sensitive information or result in losses.

We maintain sensitive data on our networks and the networks of our business partners and third-party providers, including proprietary and confidential information relating to our intellectual property, personnel, and business, and that of our customers and third-party providers. We believe that companies have been increasingly subject to a wide variety of security incidents, cyber-attacks, hacking, phishing, and other attempts to gain unauthorized access or engage in fraudulent behavior. Our policies and security measures cannot guarantee security, and our information technology infrastructure, including our networks and systems, may be vulnerable to data breaches, cyber-attacks or fraud. Third parties may attempt to penetrate and/or infect our network and systems with malicious software and phishing attacks in an effort to gain access to our network and systems. We may be subject to the risk of third parties falsifying invoices and similar fraud, frequently by obtaining unauthorized access to our vendors' and business partners' networks.

In some circumstances, we may partner with third-party providers and provide them with certain sensitive data. If these third parties fail to adopt or adhere to adequate data security practices, or in the event of a breach of their networks, this sensitive data may be improperly accessed, used or disclosed. These data breaches and any unauthorized access or disclosure of sensitive data could compromise our intellectual property, expose sensitive business information and subject us to liability.

The increase in cyber-attacks has resulted in an increased focus on cybersecurity by various government agencies. Cyber-attacks or any investigation or enforcement action related to cybersecurity could cause us to incur significant remediation costs, disrupt key business operations, and divert attention of management and key information technology resources. We may incur loss as a result of cyber-fraud, such as those experienced by companies making unauthorized payments, irrespective of robust internal controls. Our reputation, brand, and business could be harmed, and we could be subject to third-party claims in the event of such a security breach.

(24) Changes to financial accounting standards may affect our results of operations and could cause us to change our business practices.

We prepare our consolidated financial statements to conform to generally accepted accounting principles in the United States. These accounting principles are subject to interpretation by the American Institute of Certified Public Accountants, the SEC and various bodies formed to interpret and create accounting rules and regulations. Changes in these rules, or guidance relating to interpretation and adoption of these rules, could have a significant effect on our financial results and could affect portions of our business differently.

## RISKS RELATED TO OUR CAPITAL STOCK

(25) Our common stock price may be volatile, and you could lose all or part of your investment in shares of our common stock.

The price of shares of our common stock may fluctuate as a result of changes in our operating performance or prospects and other factors. Some specific factors that may have a significant effect on the price of shares of our common stock include:

- the public's reaction to our public disclosures;
- actual or anticipated changes in our operating results or future prospects;
- potential unfavorable changes from originally reported royalties by customers resulting from an audit performed by us or a third party, or self-corrected by the customer;
- strategic actions by us or our competitors, such as acquisitions or restructurings;

16

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- impact of acquisitions on our liquidity and financial performance;
- new laws or regulations or new interpretations of existing laws or regulations applicable to our business;
- changes in accounting standards, policies, guidance, interpretations or principles applicable to us;
- conditions of the industry as a result of changes in financial markets or general economic or political conditions;
- the failure of securities analysts to cover our common stock in the future, or changes in financial estimates by analysts;
- changes in analyst recommendations or earnings estimates regarding us, other comparable companies or the industry generally, and our ability to meet those estimates;
- changes in the amount of dividends paid, if any;
- changes in our financing strategy or capital structure;
- future issuances of our common stock or the perception that future sales could occur; and
- volatility in the equity securities market.

(26) Our common stock price may increase or decrease on material news or developments.

As a thinly-traded microcap company, volatility in the equity securities market may disproportionately cause swings in our stock price, upward and downward, on positive and negative developments or based on market fluctuations. We believe that computerized trading exacerbates fluctuations in our stock price.

(27) Our corporate governance documents and Oregon law may delay or prevent an acquisition of us that shareholders may consider favorable, which could decrease the value of your shares.

Our articles of incorporation, bylaws and Oregon law contain provisions that could make it more difficult for a third party to acquire us without the consent of our Board of Directors. These provisions include supermajority voting requirements for shareholders to amend our organizational documents and limitations on actions by our shareholders by written consent. In addition, our Board of Directors has the right to issue preferred stock without shareholder approval, which could be used to dilute the stock ownership of a potential hostile acquirer. Oregon law restricts the ability to vote shares of stock acquired in a transaction that causes the acquiring person to control at least one-fifth, one-third or one-half of the votes entitled to be cast in the election of directors (a “control share acquisition”). Shares acquired in a control share acquisition have no voting rights except as authorized by a vote of the shareholders. Although we believe these provisions protect our shareholders from coercive or otherwise unfair takeover tactics and thereby provide for an opportunity to receive a higher bid by requiring potential acquirers to negotiate with our Board of Directors, these provisions apply even if the offer may be considered beneficial by some shareholders.

#### ITEM 1B: UNRESOLVED STAFF COMMENTS

None.

#### ITEM 2: PROPERTIES

We lease our principal administrative, marketing, research, and intellectual property development facility, which is approximately 47,000 square feet in size and located in Beaverton, Oregon. In July 2015, we entered into an amendment with the landlord of our corporate offices in Beaverton, Oregon to extend the lease term through March 2024 for rent payments totaling \$5.5 million, payable in monthly installments.

In February 2015, we entered into a new facilities lease agreement for a facility in San Mateo, California, which is approximately 5,400 square feet in size, with a lease term through March 2020 for rent payments totaling \$1.0 million, payable in monthly installments. We currently sublease this facility to a third party with a lease term through March 2020.

We believe that our existing facilities are suitable and adequate for our current and foreseeable future needs. See Note 7 of our Notes to Consolidated Financial Statements for further lease related disclosures.



**ITEM 3: LEGAL PROCEEDINGS**

We are subject from time to time to legal proceedings and claims arising in the ordinary course of business. At this time, we do not believe that the resolution of any such matters will have a material adverse effect on our financial position, results of operations or cash flows.

**ITEM 4: MINE SAFETY DISCLOSURES**

Not applicable.



## PART II

## ITEM 5: MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock began trading on the Nasdaq Stock Market LLC in October 2008 under the symbol "DMRC."

At February 18, 2019, we had 276 shareholders of record of our common stock, as shown in the records of our transfer agent. Since many holders hold shares in "street name," we believe that there is a significantly larger number of beneficial owners of our common stock than the number of record holders.

We withhold (purchase) shares of common stock in connection with the vesting of restricted shares to satisfy required tax withholding obligations.

The following table sets forth information regarding purchases of our equity securities during the three-month period ended December 31, 2018:

Period	(a) Total number of shares purchased (1)	(b) Average price paid per share (1)	(c) Total number of shares purchased as part of publicly announced plans or programs	(d) Approximate dollar value of shares that may yet be purchased under the plans or programs
<b>Month 1</b>				
October 1, 2018 to October 31, 2018	—	\$ —	—	\$ —
<b>Month 2</b>				
November 1, 2018 to November 30, 2018	17,116	\$ 20.47	—	\$ —
<b>Month 3</b>				
December 1, 2018 to December 31, 2018	2,423	\$ 20.12	—	\$ —
<b>Total</b>	<b>19,539</b>	<b>\$ 20.43</b>	<b>—</b>	<b>\$ —</b>

(1) Fully vested shares of common stock withheld (purchased) by us in satisfaction of required withholding tax liability upon vesting of restricted stock.

## ITEM 7: MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following Management's Discussion and Analysis of Financial Condition and Results of Operations contains forward-looking statements relating to future events or the future financial performance of Digimarc, which involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward-looking statements. Please see the discussion regarding forward-looking statements included at the end of this discussion, under the caption "Forward-Looking Statements," and Item 1A, "Risk Factors" for a discussion of some of the uncertainties, risks and assumptions associated with these statements.

The following discussion should be read in conjunction with our consolidated financial statements and the related notes and other financial information appearing elsewhere in this Annual Report on Form 10-K.

All dollar amounts are in thousands except per share amounts or unless otherwise noted. The percentages within the tables included in this section may not sum to 100% due to rounding.

### Overview

Digimarc Corporation, an Oregon corporation incorporated in 2008, enables governments, banks, retailers, consumer brands and other businesses around the world to automatically and reliably identify and interact with virtually any form of media. We have pioneered the Digimarc Intuitive Computing Platform (ICP), a comprehensive set of technologies for identifying, discovering and interacting with digitally-enhanced media. The platform includes Digimarc Barcode, a proprietary method for imperceptibly enhancing packaging, print, images, thermal labels, audio and other objects with data that are detected by enabled devices, such as smart phones, computers, barcode scanners and machine-vision equipment. Digimarc Discover software enables an ecosystem of connected devices to easily identify content or materials and deliver information.

Our growth strategy encompasses both our government and commercial businesses. We plan to continue investing in research and development and sales and marketing to develop and market our products, including Digimarc Discover, Digimarc Barcode and Digimarc Guardian, and to continue to expand our intellectual property portfolio. To protect our significant efforts in creating our technology, we have implemented an extensive intellectual property protection program that relies on a combination of patent, copyright, trademark and trade secret laws, and nondisclosure agreements and other contracts. As a result, we believe we have one of the world's most extensive patent portfolios in digital watermarking and related fields, with over 1,100 U.S. and foreign patents granted and applications pending as of December 31, 2018. We continue to develop and broaden our portfolio of patented technology in the fields of media identification and management technology and related applications and systems. We devote significant resources to developing and protecting our inventions and continuously seek to identify and evaluate potential licensees for our patents.

### Critical Accounting Policies and Estimates

The preparation of financial statements in accordance with accounting principles generally accepted in the U.S. ("U.S. GAAP") requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expenses, and related disclosure of contingent assets and liabilities. On an on-going basis, we evaluate our estimates, including those related to bad debts, contingencies, goodwill, income taxes, intangible assets, marketable securities, property and equipment and revenue recognition. We base our estimates on historical experience and on other assumptions we believe to be reasonable in the circumstances. Actual results may differ from these estimates under different assumptions or conditions.

Some of our accounting policies require higher degrees of judgment than others in their application. We believe the following critical accounting policies affect our more significant judgments and estimates used in the preparation of our consolidated financial statements.

Revenue recognition: We adopted ASC 606 “Revenue from Contracts with Customers” using the cumulative effect method with an effective date of January 1, 2018. Therefore, the comparative period information prior to January 1, 2018 has not been adjusted and continues to be reported under ASC 605 “Revenue Recognition” and ASC 985 “Software.”

## ASC 606

Effective January 1, 2018, revenue is recognized in accordance with ASC 606 by applying the following steps:

Step 1: Identify the contract(s) with a customer.

Step 2: Identify the performance obligations in the contract.

Step 3: Determine the transaction price.

Step 4: Allocate the transaction price to the performance obligations in the contract.

Step 5: Recognize when (or as) the entity satisfies a performance obligation.

We derive our revenue primarily from professional services, subscriptions and licensing of our intellectual property. Applicable revenue recognition criteria are considered separately for each performance obligation as follows:

Service revenue consists primarily of software development and consulting services. The majority of service revenue arrangements are structured as time and materials consulting agreements. Revenue for development and consulting services is recognized as the services are performed. Billing for services rendered generally occurs within one month after the services are provided.

Subscription revenue includes revenue derived from the sale of Digimarc Discover, Digimarc Barcode and Digimarc Guardian products and services, is generally recurring, paid in advance and recognized over the term of the subscription, which is generally one to three years.

License revenue originates primarily from licensing our intellectual property where we receive license fees and/or royalties as our income stream. License fees are typically paid in advance and recognized when the customer has the right to the intellectual property and the license period has begun, and royalties are typically billed in arrears and recognized in the quarter in which the royalty was earned.

Some customer arrangements contain multiple performance obligations such as professional services, software licenses, and maintenance and support fees. We account for individual products and services separately if they are distinct. To determine the transaction price, we consider the terms of the contract and our customary business practices. Some contracts may contain variable consideration. In those cases, we estimate the amount of variable consideration based on the sum of probability-weighted amounts in a range of possible consideration amounts. As part of this assessment, we will evaluate whether any of the variable consideration is constrained and if it is we will not include it in the transaction price. The consideration is allocated between distinct products and services based on their stand-alone selling prices. For items that are not sold separately, we estimate the standalone selling price based on reasonably available information, including market conditions, specific factors affecting us, and information about the customer. For distinct products and services, we typically recognize the revenue associated with these performance obligations as they are delivered to the customer. For performance obligations which are not considered distinct, we typically recognize revenue over the term of the contract as the customer simultaneously receives and consumes the goods and services as we perform them.

## ASC 605 and ASC 985

For the comparative period prior to January 1, 2018, revenue was recognized under ASC 605 and ASC 985 when the following four criteria were met:

(i) persuasive evidence of an arrangement exists,

- (ii) delivery has occurred,
- (iii) the fee is fixed or determinable, and
- (iv) collection is reasonably assured or probable.

All revenue recognized in the Consolidated Statements of Operations is considered to be revenue from contracts with customers.

21

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## Results of Operations—the Years Ended December 31, 2018 and December 31, 2017

The following tables present our consolidated statements of operations data for the periods indicated.

	Year Ended December 31, 2018	Year Ended December 31, 2017
<b>Revenue:</b>		
Service	\$ 12,774	\$ 12,936
Subscription	6,041	5,519
License	2,377	6,758
<b>Total revenue</b>	<b>21,192</b>	<b>25,213</b>
<b>Cost of revenue:</b>		
Service	5,922	5,792
Subscription	1,907	2,264
License	597	502
<b>Total cost of revenue</b>	<b>8,426</b>	<b>8,558</b>
<b>Gross profit</b>	<b>12,766</b>	<b>16,655</b>
<b>Operating expenses:</b>		
Sales and marketing	19,140	16,636
Research, development and engineering	15,971	15,435
General and administrative	9,897	9,680
Intellectual property	1,282	1,469
<b>Total operating expenses</b>	<b>46,290</b>	<b>43,220</b>
Operating loss	(33,524 )	(26,565 )
Other income, net	1,057	588
Loss before income taxes	(32,467 )	(25,977 )
Benefit (provision) for income taxes	(39 )	206
<b>Net loss</b>	<b>\$ (32,506 )</b>	<b>\$ (25,771 )</b>

	Year Ended December 31, 2018		Year Ended December 31, 2017	
	Percentages are percent of total revenue			
<b>Revenue:</b>				
Service	60	%	51	%
Subscription	29		22	
License	11		27	
Total revenue	100		100	
<b>Cost of revenue:</b>				
Service	28		23	
Subscription	9		9	
License	3		2	
Total cost of revenue	40		34	
Gross profit	60		66	
<b>Operating expenses:</b>				
Sales and marketing	90		66	
Research, development and engineering	75		61	
General and administrative	47		38	
Intellectual property	6		6	
Total operating expenses	218		171	
Operating loss	(158	)	(105	)
Other income, net	5		2	
Loss before income taxes	(153	)	(103	)
Benefit (provision) for income taxes	(0	)	1	
Net loss	(153	%)	(102	%)

## Summary

Total revenue decreased \$4.0 million, or 16%, to \$21.2 million, primarily as the result of lower license revenue. License revenue was lower reflecting the impact of the \$3.5 million upfront license fee realized in the third quarter of 2017 and \$0.9 million of royalties realized in the first nine months of 2017 from the licensee. In exchange for the upfront license fee, we waived any future royalty obligations from this licensee in one of the licensed fields of use.

Total operating expenses increased \$3.1 million, or 7%, to \$46.3 million, reflecting higher investment, in sales and marketing, primarily headcount related costs, as we continue to address important opportunities in market development and delivery of Digimarc Discover and Digimarc Barcode.

## Revenue

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)
<b>Revenue:</b>				
Service	\$ 12,774	\$ 12,936	\$ (162 )	(1 )%
Subscription	6,041	5,519	522	9 %
License	2,377	6,758	(4,381 )	(65 )%
<b>Total</b>	<b>\$ 21,192</b>	<b>\$ 25,213</b>	<b>\$ (4,021 )</b>	<b>(16 )%</b>
<b>Revenue (as % of total revenue):</b>				
Service	60	% 51	%	
Subscription	29	% 22	%	
License	11	% 27	%	
<b>Total</b>	<b>100</b>	<b>% 100</b>	<b>%</b>	

**Service.** Service revenue consists primarily of revenue derived from the sale of software development and consulting services. The majority of service revenue arrangements are structured as time and materials consulting agreements. Most of our service revenue is derived from contracts with the Central Banks and government agency contractors. The agreements range from several months to several years in length, and our longer term contracts are subject to work plans that are reviewed and agreed upon at least annually. These contracts generally provide for billing hours worked at predetermined rates and, to a lesser extent, reimbursement for third party costs and services. Increases or decreases in the services provided under these contracts are generally subject to both volume and price changes. The volume of work is generally negotiated at least annually and can be modified as the customer's needs change. We also have provisions in our longer term contracts that allow for specific hourly rate increases on an annual basis to account for cost of living variables. Contracts with government agency contractors are generally shorter term in nature, less linear in billings and less predictable than our longer term contracts because the contracts with government agency contractors are subject to government budgets and funding.

The decrease in service revenue was primarily due to lower volume of program work with the Central Banks. The volume of program work can vary year to year depending on the program roadmap governed by the Central Banks.

**Subscription.** Subscription revenue includes revenue derived from the sale of Digimarc Discover, Digimarc Barcode and Digimarc Guardian products and services, and is generally recurring in nature, paid in advance and recognized over the term of the subscription.

The increase in subscription revenue was due to higher Digimarc Discover and Digimarc Barcode revenue, partially offset by lower Digimarc Guardian revenue. Digimarc Discover and Digimarc Barcode revenue increased due to contracts with new customers during the year and escalating annual fees from existing customers. Digimarc Guardian revenue declined largely due to one customer contract termination during the year.

**License.** License revenue originates primarily from licensing our intellectual property where we receive license fees and/or royalties as our income stream.



The decrease in license revenue was primarily due to the impact of the \$3.5 million upfront license fee we realized in the third quarter of 2017 and \$0.9 million of royalties realized in the first nine months of 2017 from the licensee. In exchange for the upfront license fee, we waived any future royalty obligations from this licensee in one of the licensed fields of use.

## Revenue by geography

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)
<b>Revenue by geography:</b>				
Domestic	\$ 5,573	\$ 5,116	\$ 457	9 %
International	15,619	20,097	(4,478 )	(22 )%
Total	\$ 21,192	\$ 25,213	\$ (4,021 )	(16 )%
<b>Revenue (as % of total revenue):</b>				
Domestic	26	% 20	%	
International	74	% 80	%	
Total	100	% 100	%	

The increase in domestic revenue was primarily due to higher Digimarc Discover and Digimarc Barcode revenue, partially offset by lower Digimarc Guardian revenue from domestic customers.

The decrease in international revenue was primarily due to lower license revenue reflecting the impact of the \$3.5 million upfront license fee realized in the third quarter of 2017 and \$0.9 million of royalties realized in the first nine months of 2017 from the licensee.

## Cost of revenue

**Service.** Cost of service revenue primarily includes costs that are allocated from research, development and engineering, sales and marketing and intellectual property that relate directly to performing services under our customer contracts and direct costs of program delivery. Costs include:

- compensation, benefits, incentive compensation in the form of stock-based compensation and related costs of our software developers, quality assurance personnel, product managers, business development managers and other personnel where we bill our customers for time and materials costs;
- payments to outside contractors that are billed to customers;
- charges for equipment directly used by customers;
- depreciation for machinery, equipment and software directly used by customers;
- travel costs directly attributable to development and consulting contracts; and
  - charges for infrastructure and centralized costs of facilities and information technology.

**Subscription.** Cost of subscription revenue primarily includes:

- compensation, benefits, incentive compensation in the form of stock-based compensation and related costs of operations personnel;
- cost of outside contractors that provide operational support;
- amortization of existing technology acquired in the acquisition of Attributor Corporation; and
- Internet service provider connectivity charges and image search data fees to support the services offered to our subscription customers.

License. Cost of license revenue primarily includes:

- amortization of capitalized patent costs; and
- amortization of patent maintenance fees.

25

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## Gross profit

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)
<b>Gross Profit:</b>				
Service	\$ 6,852	\$ 7,144	\$ (292 )	(4 )%
Subscription	4,134	3,255	879	27 %
License	1,780	6,256	(4,476 )	(72 )%
<b>Total</b>	<b>\$ 12,766</b>	<b>\$ 16,655</b>	<b>\$ (3,889 )</b>	<b>(23 )%</b>
Gross Profit (as % of related revenue components):				
Service	54	% 55	%	
Subscription	68	% 59	%	
License	75	% 93	%	
<b>Total</b>	<b>60</b>	<b>% 66</b>	<b>%</b>	

The decrease in total gross profit was primarily due to lower license revenue.

The decrease in service gross profit as a percentage of service revenue was insignificant.

The increase in subscription gross profit as a percentage of subscription revenue was primarily due to higher subscription revenue and completion of amortization of our acquired intangible assets.

The decrease in license gross profit as a percentage of license revenue was primarily due to lower license revenue.

## Operating expenses

We allocate certain costs of research, development and engineering, sales and marketing, and intellectual property to cost of revenue when they relate directly to our customer contracts. We record all remaining, or “residual,” costs as sales and marketing, research, development and engineering, general and administrative, and intellectual property expenses.

## Sales and marketing

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)
Sales and marketing	\$ 19,140	\$ 16,636	\$ 2,504	15 %
Sales and marketing	90	% 66	%	

(as % of total revenue)

Sales and marketing expenses consist primarily of:

- compensation, benefits, incentive compensation in the form of stock-based compensation and related costs of sales and marketing employees and product managers;
- travel and market research costs, and costs associated with marketing programs, such as trade shows, public relations and new product launches;
- professional services and outside contractors costs for product and marketing initiatives; and
  - charges for infrastructure and centralized costs of facilities and information technology.

26

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The increase in sales and marketing expenses was due primarily to:

- increased headcount and compensation-related expenses of \$2.2 million;
  - increased charges for infrastructure and centralized costs of \$0.5 million due to increased costs and headcount; partially offset by
  - decreased recruiting costs of \$0.3 million.
- Research, development and engineering

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)
Research, development and engineering	\$ 15,971	\$ 15,435	\$ 536	3 %
Research, development and engineering (as % of total revenue)	75	% 61	%	

Research, development and engineering expenses arise primarily from three areas that support our business model:

**Fundamental Research:**

- investigation of new digital watermarking algorithms to increase robustness and/or computational efficiency;
- research of mobile device usage models and imaging sub-systems in camera-phones;
- industry conference participation and authorship of papers for industry journals;
- survey and study of human and computer interaction models with a focus on mobile devices and modeling of intent;
- development of new intellectual property, including documentation of claims and production of supporting diagrams and materials;
- research in multi-spectral analyses, machine learning, machine readable indicia and other content identification technologies;
- development of metadata ranking algorithms for matching Internet file content against reference database; and
- investigation of substrates, printing techniques, and printing technology relating to consumer packaged goods and thermal labels.

**Platform Development:**

- tuning and optimization of implementation models to improve resistance to non-malicious attacks and routine transformations, such as JPEG, cropping and printing;
- mobile platform creation to leverage device-specific capabilities (e.g., instruction sets and Graphics Processing Units);
- mobile platform optimization involving usage of multiple sensors simultaneously;
- embedded systems platform creation and tuning for barcode scanners, thermal label printers, and machine vision environments;
- tuning big data analytics transformation and metrics aggregation engine;
- tuning data-driven Internet crawling infrastructure with policy-driven feedback loop; and
- assembly of master book publishing catalog based on aggregation and reconciliation of multiple public data sources.



**Product Development:**

- delivery and enhancement of Digimarc Barcode for an expanding list of applications, including packaging for consumer packaged goods, thermal labels for fresh foods, and machine vision applications for manufacturing and recycling;
- improvements to the Digimarc Barcode Manager to provide campaign management and routing services for the Digimarc Discover platform;
- maintenance of the web-hosted image enhancement service in support of Digimarc Discover platform;
- development and optimization of production level image enhancement tools and quality control services;
- iterative development and release of the Digimarc Discover application for the iOS and Android platforms; and
- development of real-time analytics portal to support anti-piracy services for the publishing industry.

Research, development and engineering expenses consist primarily of:

- compensation, benefits, incentive compensation in the form of stock-based compensation and related costs of software and hardware developers and quality assurance personnel;
- charges for infrastructure and centralized costs of facilities and information technology;
- payments to outside contractors; and
- the purchase of materials and services for product development.

The increase in research, development and engineering expenses was due primarily to:

- increased headcount and compensation-related expenses of \$0.5 million; and
- increased charges for infrastructure and centralized costs of \$0.2 million due to increased costs and headcount; partially offset by
- decreased recruiting costs of \$0.1 million.

**General and administrative**

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)
General and administrative	\$ 9,897	\$ 9,680	\$ 217	2 %
General and administrative (as  % of total revenue)	47	% 38	%	

We incur general and administrative costs in the functional areas of finance, legal, human resources, executive and board of directors. Costs for facilities and information technology are also managed as part of the general and administrative processes and are allocated to this area as well as each of the areas in cost of revenue, sales and marketing, research, development and engineering and intellectual property.

General and administrative expenses consist primarily of:

- compensation, benefits and incentive compensation in the form of stock-based compensation and related costs of general and administrative personnel;
- third party and professional fees associated with legal, accounting and human resources functions;
- costs associated with being a public company; and



- charges for infrastructure and centralized costs of facilities and information technology.

The increase in general and administrative expenses was due primarily to:

- increased compensation-related expenses of \$1.0 million;
- increased depreciation and amortization expenses of \$0.3 million; partially offset by
- decreased charges for infrastructure and centralized costs of \$0.7 million, which were allocated to sales and marketing and research, development and engineering due to increased headcount in those areas; and
- decreased professional fees of \$0.3 million.

Intellectual property

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)
Intellectual property	\$ 1,282	\$ 1,469	\$ (187 )	(13 )%
Intellectual property (as % of total revenue)	6	% 6	%	

We incur intellectual property expenses that arise primarily from costs associated with documenting, applying for, and maintaining domestic and international patents and trademarks.

Gross expenditures for intellectual property costs, before reflecting the effect of capitalized patent costs, primarily consist of:

- compensation, benefits and incentive compensation in the form of stock-based compensation and related costs of attorneys and legal assistants;
- third party costs, including filing and governmental regulatory fees and fees for outside legal counsel and translation costs, each incurred in the patent process;
- charges to write off previously capitalized patent costs for patent assets we abandon; and
  - charges for infrastructure and centralized costs of facilities and information technology.

Intellectual property expenses can vary from period to period based on the level of capitalized patent activity.

The decrease in intellectual property expenses was primarily due to lower write-offs of abandoned patent costs of \$0.2 million.

Stock-based compensation

	Year Ended December 31, 2018	Year Ended December 31, 2017	Dollar Increase (Decrease)	Percent Increase (Decrease)

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Cost of revenue	\$ 613	\$ 663	\$ (50 )	(8 )%
Sales and marketing	1,649	1,440	209	15 %
Research, development and engineering	1,361	1,359	2	0 %
General and administrative	3,386	2,974	412	14 %
Intellectual property	289	321	(32 )	(10 )%
Total	\$ 7,298	\$ 6,757	\$ 541	8 %

The increase in stock-based compensation expense was due primarily to increased headcount and the timing and amount of stock awards.

We anticipate incurring an additional \$14,055 in stock-based compensation expense through December 31, 2022 for awards outstanding as of December 31, 2018.

Other income, net