

July 2019

ComCap's perspectives on Visual Search technology



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What is Visual Search?

Retailers are looking for new ways to streamline product discovery and Visual Search is enabling them

- At its core, **Visual Search** can **answer key questions** that are more easily resolved using **visual prompts**, unlike traditional text-based searching
 - From a **consumer standpoint**, visual search enables **product discovery**, connecting consumers directly to the products they desire
- **Visual search** is helping **blend physical experiences and online convenience** as retailers are competing to offer the best service for high-demanding customers through innovative technologies
- Consumers are now actively seeking **multiple ways to visually capture products** across channels, resulting in **various applications** including:
 - **Image Recognition:** enabling consumers to connect pictures with products, either through camera- or online- produced snapshots through AI-powered tools
 - **QR / bar code scanning:** allowing quick and direct access between consumers and specific products
 - **Augmented Reality enabled experiences:** producing actionable experiences by recognizing objects and layering information on top of a real-time view



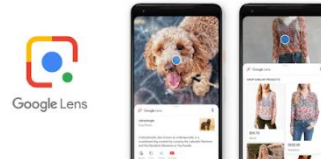
Neiman Marcus
Introduces Snap.
Find. Shop. (2015)



Samsung
Introduces Bixby
Vision (2017)



Google Introduces
Google Lens
(2017)



Amazon
Introduces
StyleSnap (2019)



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Source: eMarketer, News articles

Visual Search's role in retail

Visual Search capabilities are increasingly becoming the industry standard for major ecommerce platforms

85%

Consumers place more importance on visual aids than written descriptions when shopping online for clothing or furniture

62%

Consumers want visual search capabilities that will allow them to quickly browse new products

>600mn

Monthly visual searches on Pinterest resulting in an 8.5% ad conversion rate

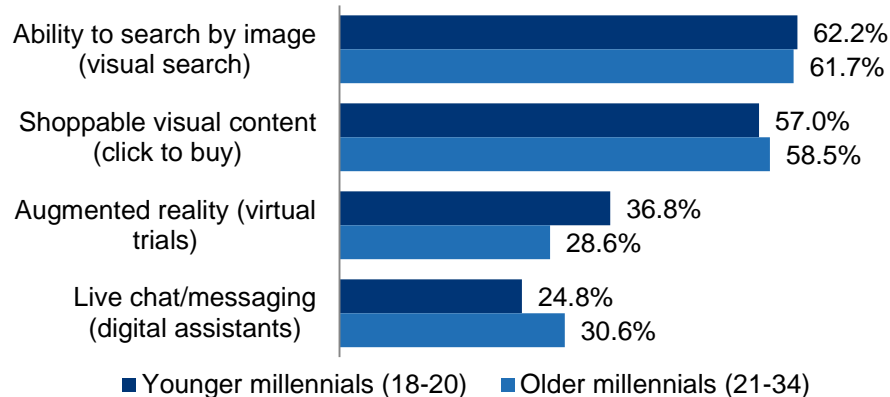
30%

Increase in revenue is expected for **early adopters** of visual search technology by 2021

Early adopters of Visual Search



Essential features for the digital experience



Key drivers of Visual Search

- ✓ Increased demand for **personalized** experiences
- ✓ Boosts **product discoverability**
- ✓ **Increases the amount of time** spent on platform
- ✓ Builds **more engagement** on social media channels
- ✓ **Higher impulse purchase volume** through click-to-buy advertising

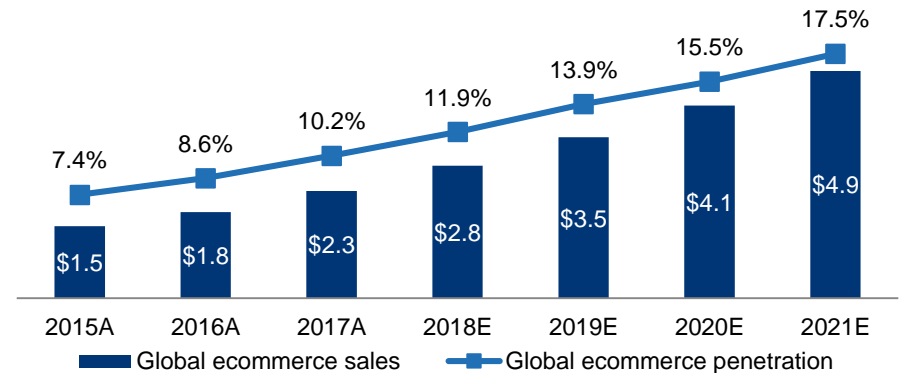


Continued growth in ecommerce is increasing its share of total retail

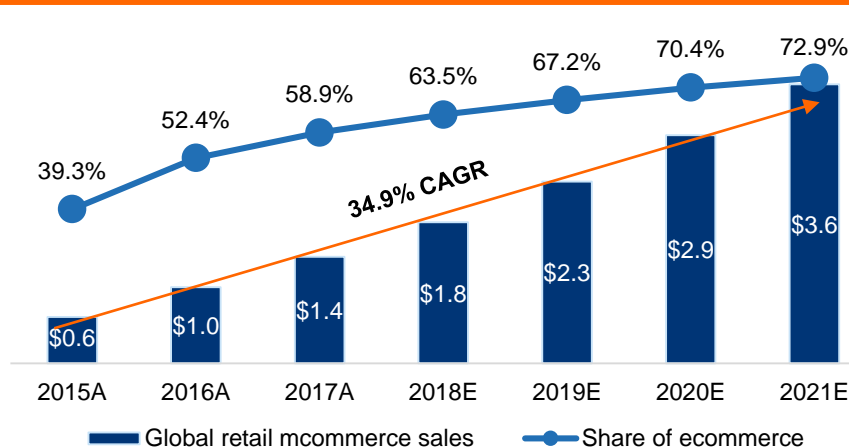
As mobile platforms' popularity as a transaction channel increases, mcommerce growth skyrockets

- Global ecommerce market growth and its share in overall retail will continue to rise in the following years
- The 5 fastest growing ecommerce markets are expected to be China, US, France, Australia, and Russia
 - The US and China remain leaders in the market
- This growth is primarily being driven by increased mobile penetration, faster delivery times & more convenient payment options
- Online fashion shopping is expected to lead all product categories in ecommerce sales growth

Global ecommerce sales (\$tn) and ecommerce penetration (%)



Global mcommerce sales (\$tn) and Share of ecommerce (%)*



- Global mcommerce is expected to reach \$2.3tn in 2019
- As of 2019, 67% of the global population owns a mobile phone and 79% of smartphone users have made a purchase using their mobile device in the last 6 months
- Mobile data traffic across the globe is projected to increase by 700% between 2016 and 2021
- In 2018, ~64% of paid Google search clicks originated from mobile devices, with mobile phones accounting for nearly 56% of total clicks
- However, average order sizes for mcommerce (~\$79) remain far lower than that of traditional devices (~\$180) due to security concerns & sub-optimal mobile apps

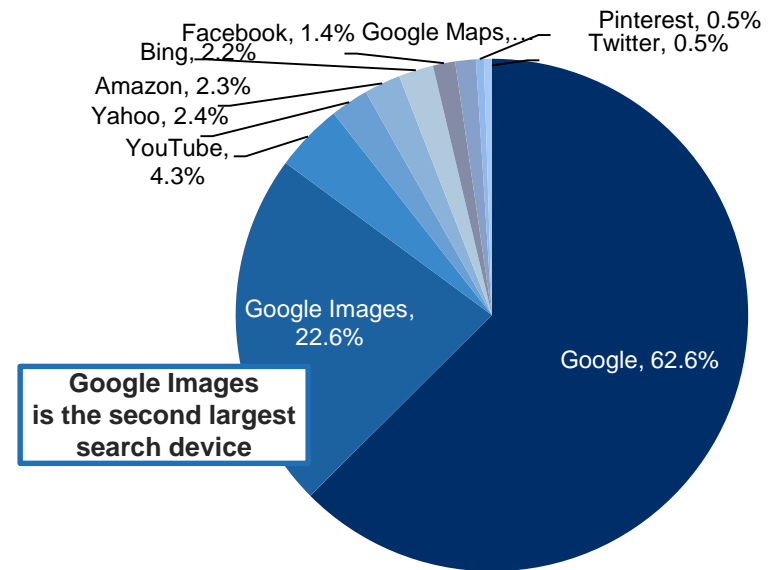


Visual search is estimated to grow rapidly in the near future

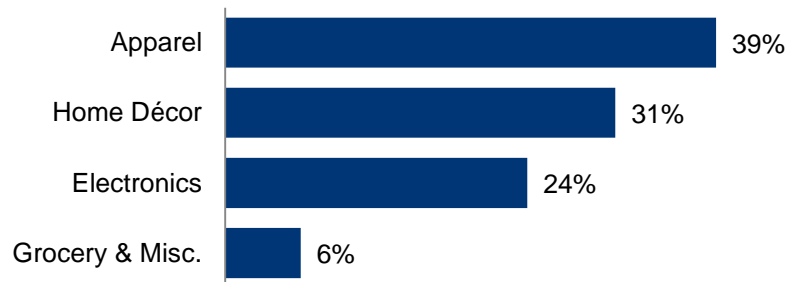
Following the rapidly increasing popularity of visual search, the retail industry is investing heavily into technological upgrades

- The global image recognition market, which was estimated at \$17.9 billion in 2017, is expected to reach ~\$86 billion by 2025, registering a CAGR of 21.8%
- The image search segment is expected to contribute a major share, roughly \$30 billion (~35%) by 2025
- Ecommerce is expected to be the primary driver of this growth as visual search returns become increasingly accurate
- Several companies have been gearing up for this new growth
 - ✓ In April 2019, Lonely Planet announced the acquisition of visual search company Trill
 - ✓ Donde Search, a specialist fashion visual search app maker, recently raised \$6.5mn in Series A funding
 - ✓ In Feb 2019, image recognition startup ViSenze raised \$20m in Series C funding, bringing its total capital raised to date to \$34m
 - ✓ Other startups in the space include Syte.ai, Clarifai, Imagga, Slyce, Vue.ai

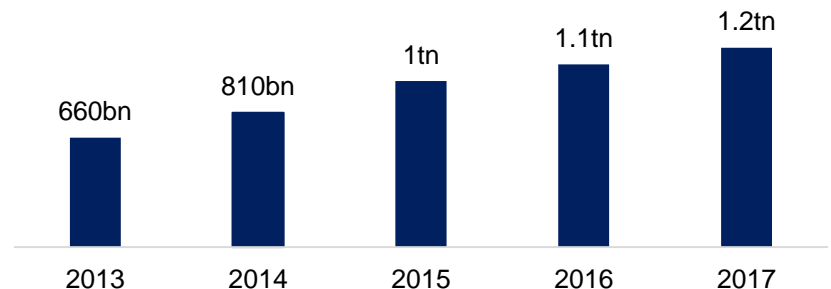
Share of web searches (Feb 2018)



Visual Search usage across retail categories



Growth of digital photos taken worldwide



The rise of visual search: How technology & retail leaders are adapting

Market leaders across a variety of sectors have quickly made plays in the space as they race to adopt superior solutions

Early Adopters of Visual Search	
Fashion	       
Home	   
Market-places	   
Technology	              
Social Media	   
General Retail & Grocery	       
Others	     

- ✓ Providing visual search features on mobile apps enables users to take pictures of items they like and upload them online to search for similar items in the firm's inventory
- ✓ Visual search tools for snap and upload, include in-store 3D scanning to find similar products at the retail location
- ✓ Leading innovators drive awareness and demand in the ecosystem by continuously upgrading existing solutions for visual search
- ✓ Plug-ins enable sharing over social media and paid promotional displays come integrated with click-to-buy capable advertisements
- ✓ Visual search tools deployed by traditional retailers are largely focused on improving customer engagement in-store as well as online
- ✓ Several other industries like travel, shoes, automobiles, and airlines are steadily integrating visual search tools onto their own platforms

Case study: Pinterest champions visual search

*"Everything on Pinterest is visual...That's the thing about a good idea, you know it when you see it. **Visual discovery is all about the tools to find the ideas** that are your taste and your style."*

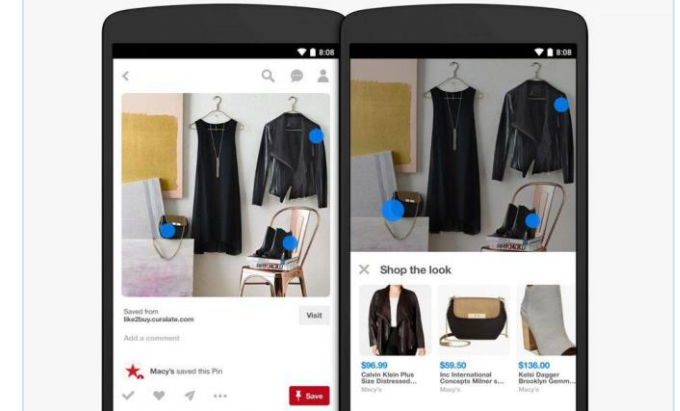
– Ben Silbermann, CEO, Pinterest, June 6, 2017

Pinterest's ambition to elevate its visual search platform has led to three visual discovery products including Lens, Shop the Look, and Instant Ideas, which are all available on its iOS and Android application

Visual Search products offered by Pinterest

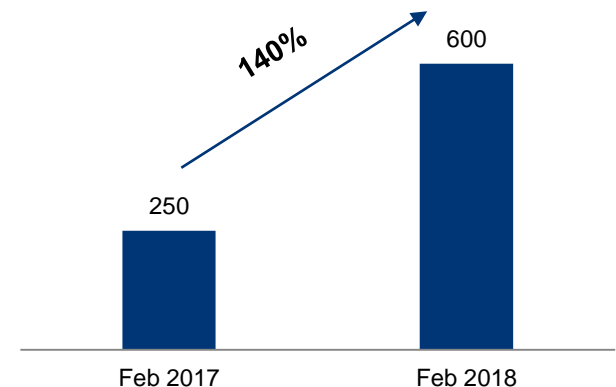
- **Lens:** enables "pinners" to use their phone camera to search on Pinterest
 - Allows users to take a photo or use an existing image in their camera roll to search for pins and themes related to the photo
 - Returns similar goods shared by other Pinterest users
 - Can be used by customers to find specific products on Pinterest or similar products made by other competing businesses
- **Shop the Look:** new feature powered by artificial intelligence to find objects in Pinned photos that resemble products from Pinterest-affiliated vendors
- **Instant Ideas:** feature that enables users who see a concept they like in a Pin to tap the circle in the bottom-right corner for similarly themed items

Shop the Look platform



Pinterest Lens visual searches

(In millions)



Case study: ASOS leverages image recognition technology

Technology will be key to meeting changing customer expectations

“Visual search, voice search and AI will help customers navigate the offer in a better and more convenient way.”

—Nick Beighton, CEO of ASOS, PR dated August 21, 2017

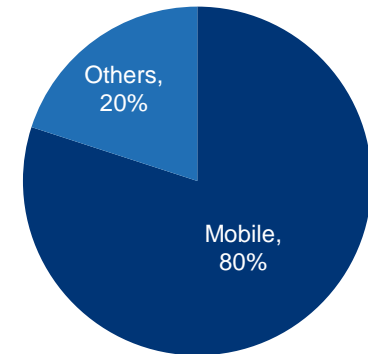
ASOS's Style Match

Style Match: A visual search tool built into the ASOS App that assists in narrowing down the customer focus and enabling product discovery

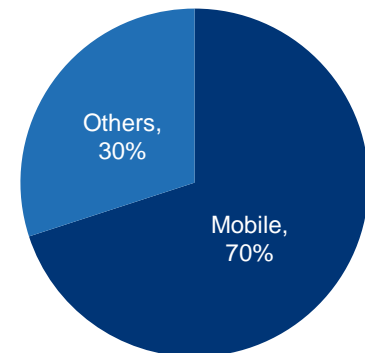
- The tool allows users to upload photos of clothing and accessories to search for similar products within ASOS' inventory
- The visual search tool can be accessed by clicking the new camera icon in the app's search bar
 - The app prompts the user to take a photo or provide a photo from the photo library
 - It then searches ASOS' inventory for clothing or accessories of that image
 - After identifying the products in the image, items sold by ASOS that are similar to what the user is looking for are displayed
- The inspiration for the Style Match tool came from **ASOS' ongoing effort to improve the customer shopping experience**
- It is comparable to a **reverse image search** for shoppable clothes

Currently, there are 85,000 products available through search, and 5,000 new items are being added weekly

ASOS's website traffic sources



Source of orders to ASOS



Users spend an average of 80 minutes on the app each month

Case study: Home Depot launches visual search tool

Home Depot's mobile application

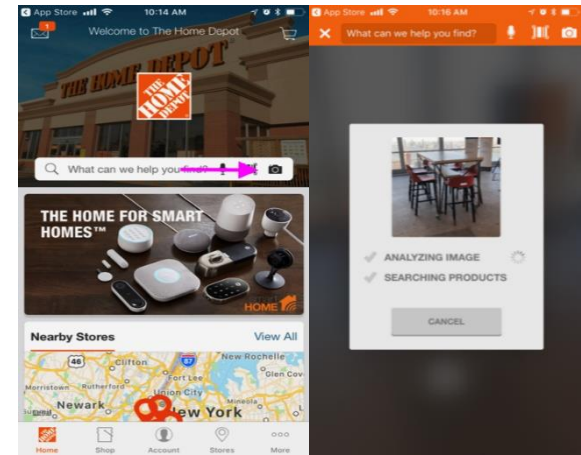
A visual search tool was built into the Home Depot app that enables shoppers to photograph real-world items, find similar products in the Home Depot catalogue and buy them in-store:

- Originally launched as a beta test in early 2016 on Home Depot's mobile app, the feature was eventually rolled out on its main page due to strong customer adoption
- Previously, Home Depot customers had to specifically access the visual search feature, but now they can simply tap the search icon on every screen and select the camera to take pictures of the product they are looking for
- Home Depot's 3D visual search tool eliminates previous issues customers faced when looking for one of its many (often small) products and has increased sales as a result
- Home Depot is one of the first to deploy the technology to move items off store shelves faster while customers are still in-store

[Launching the visual search tool is the] result of Home Depot's efforts towards developing interconnected retail, "we don't just develop tech for the sake of coming up with new and cool things for people to use; **we really want to make the shopping experience easier for our customers.** This is a good example of that."

– Stephen Holmes, Director of Corporate Communications, January 2016

Home Depot's visual search technology



48%

More products viewed by visitors using visual search

75%

More return visits by customers using visual search

51%

More time spent on the mobile app by visitors using visual search

9%

Higher average order value from consumers using visual search

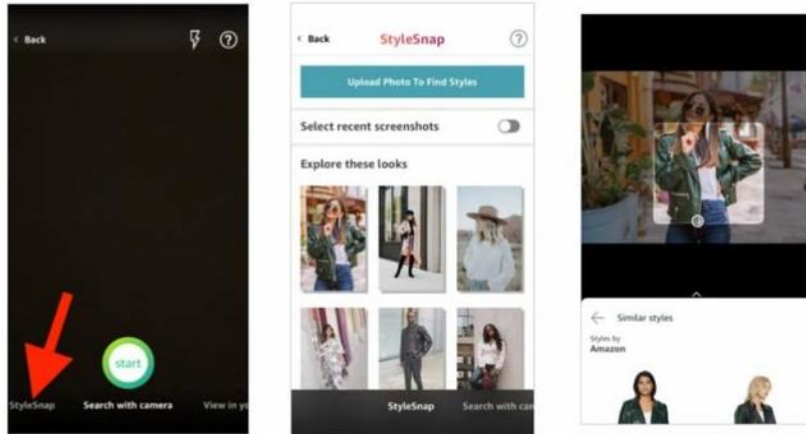


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Source: Home Depot, Retail Dive, Press Releases

Case Study: Amazon launches StyleSnap, a visual search styling application

StyleSnap functionality



- Allows users to upload photos or screenshots of desired fashion looks to get identical or similar product recommendations from Amazon's apparel inventory
- Consumers are able to filter search fields by price range, colors, and brand
- Deep learning and neural networks assist in detecting colors and patterns which can then be used to classify the articles of clothing into a broad range of specific categories (i.e. flannel shirts, flared dresses)
- The technology's implementation will be able to identify accessories, garments, and foot wear from the images provided

Easily integrated StyleSnap into the Amazon Alexa application

Amazon's Visual Search efforts



- Amazon's Echo Look, launched in 2017, enables users to compare photos of the user wearing different clothes; provides style recommendations based on fit, colors, and current fashion trends
- Invested over \$870 million into AI development and research in 2018

"The simplicity of the customer experience bellies the **complexity of the technology** behind it."

– Jeff Wilke, CEO of Worldwide Consumer Amazon, on StyleSnap, June 5, 2019

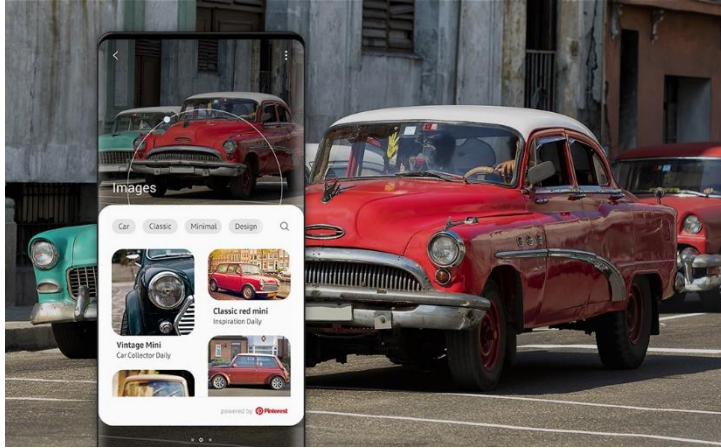
Significance

- Bolsters Amazon's private label apparel brand sales through visual searches
 - StyleSnap can be implemented into Amazon's Influencer Program that seeks to draw more sales through commission based partnerships with social media influencers



Case Study: Samsung's Bixby Vision enables Samsung smartphone users to search smarter

Bixby Vision functionality



- Bixby Vision is Samsung's new AI interface assistant that is exclusively available on the Samsung Galaxy S8, S9, and S10
- Well-integrated with Samsung's original voice assistant, Bixby
- Bixby Vision yields results in real time when capturing objects of interest through Samsung phone cameras
 - Bixby Vision can identify an object and its price, read QR codes, translate 54 languages, spot landmarks, provide nutrition information, solve math problems, and allow users to try on make-up, among other capabilities
- Can recognize different voices and personalize different answers depending on the user

Samsung's Visual Search efforts

- Samsung partnered with Pinterest to integrate visual discovery technology into their smartphones in 2017
- In 2018, Samsung revealed it will invest about \$22bn into artificial intelligence by 2020
- Samsung plans to also increase the number of researchers to 1,000 individuals across its global AI research centers going into 2020
- Samsung currently operates five AI centers around the world

"[Bixby] will be **more personal**, with enhanced natural language capabilities for more natural commands and **complex processing**, so it can really get to know and understand not only who you are, but who members of your family are, and tailor its response and actions appropriately."

– Eui-Suk Chung, EVP of Mobile Communications Business at Samsung Electronics

Significance

- Allows Samsung to remain competitive against competitors (i.e. Apple's Siri, Microsoft's Cortana, Amazon's Alexa, and Google Lens)
- Samsung can implement Bixby Vision across their product offerings including TVs, speakers, refrigerators, and washing machines



Case study - Fluid Configure, Product discovery through customization

Customized products inspire customer loyalty: Increasing conversion rates and price premium

CUSTOMERS LOVE CREATING UNIQUE PRODUCTS

Offering your customers the ability to create unique, exclusive products using a visually rich, engaging interactive experience on an enterprise class SAAS platform creates significantly enhanced opportunities for revenue, loyalty and engagement.



INCREASE PRICE PREMIUM

25-30% increase in price premium over standard products.
-Bain/Fluid, 2013



INCREASE CONVERSION RATES

2X conversion rates vs. non-customized products.
-Fluid customers



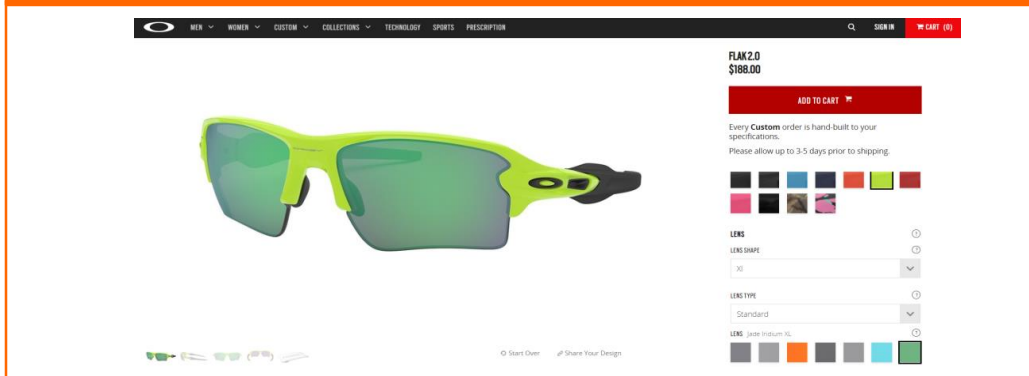
INCREASE CUSTOMER LOYALTY

45% increase in Net Promoter Score results in higher sales, referrals and lifetime customer value.

Software platform for dynamic customization of apparel and accessories

- Configure is Fluid's (acquired by Astound in 2018) software platform designed for product customization, allowing brands to differentiate themselves from their competitors
- Configure 3.0 is a market-leading configurator that is fully optimized for both desktop and mobile experiences. This on-demand system features a robust, proven set of features out of the box for simple and rapid implementation, seamlessly integrating with any eCommerce platform and scaling to meet consumer demand. Every feature in Configure 3.0 is API-based, offering a highly flexible user interface (UI) and user experience (UX) that enables you to tailor each component of the platform to a brand's specific needs
- Unique and fully customizable designs are fully appreciated by customers, as participating brands have experienced 2x conversion rates compared to non-customized products
- Fluid has over 25 clients using Configure, with more than 7,000 daily products created for a total of \$300M in transactions yearly















Example: Oakley offers customizable frame and lens color options through Fluid Configure












Key Visual Search Players: A comparative analysis

	 clarifai	 Slyce <small>The Want Engine.</small>	 syte	 VISENZE	 Vue.ai
Core solution	Advanced image recognition systems designed for businesses to detect near-duplicates and visual search	Provides retailers an integrated app-based solution for product, barcode, and print recognition and finding similar products	Provides retailer apps with features including visual search, automated textual tags, and product recommendations	Visual technology software that identifies images, finds related images & provides SDKs for grouping and sorting search results	Extracts data from images, analyzes it with user behavior to help retailers automate and personalize the retail process
HQ	New York, NY	Philadelphia, PA	Tel Aviv, Israel	Singapore, Singapore	Fremont, CA
Founded	2013	2012	2015	2012	2016
Key Clients & Partners	      	              	        	      	          








Key M&A in Visual Search

Company	Sub-vertical	Description	Acquirers	Strategic Rationale	Date
 GROKSTYLE	Application Software	Develops visual search recognition software for furniture and home decor		Improves Facebook's marketplace platform, specifically in home décor	Feb 2019
 OUTWARD	Application Software	Leading 3-D imaging and augmented reality platform for the home furnishings and décor industry		Drive digital innovation to create highly engaging and interactive consumer shopping experiences	Nov 2017
 REIGN AI	Interactive Media and Services	Develops computer vision technology that leverages artificial intelligence to review, tag, and rate images on various criteria		Regaind's computer vision API is used to analyze content of photos to improve Face ID and Photos application	Sep 2017
 PARTPIC	Application Software	Visual recognition technology that allows users to search for replacement maintenance and operations parts.		Improves Amazon's marketplace search ability specifically in the repair and maintenance sector	Nov 2016
 corrigan	Application Software	Develops image recognition software for copyright monitoring to identify how and where images are used		Corrigan's image processing and computer vision capabilities are used for product detection in images	Oct 2016
 Moodstocks	Interactive Media and Services	Develops machine learning based technology to analyse images, improving image recognition on smartphones		Improve Google image search using machine-learning based image recognition technology	Jul 2016
 hayneedle	Internet and Direct Marketing Retail	Operates as an online retailer of home, work, and play products		Expand into high margin home retail category to increase customer acquisition	Feb 2016

Key private placements in Visual Search

Company	Date	Description	Round Details	Investors
 Vue.ai	Apr 2019	An end-to-end retail automation platform that is redesigning the future of fashion retail with AI	Series B \$17.0m	Sequoia Capital India, Global Brain, Falcon Edge Capital
 VISENZE	Feb 2019	Develops advanced visual search and image recognition solutions for enterprises and recommends visually similar items to online shoppers	Series C \$20.0m	WI Harper Group, UOB Venture, Tembusu ICT Fund, Sonae IM, Singapore Press Holdings, Rakuten Capital, Raffle Venture Partners, Gobi Partners, Enspire Capital, 31 Ventures Global Innovation Fund
 ZORROA	Jul 2018	Develops AI-driven software and services for visual search and business intelligence	Seed \$7.0m	Gradient Ventures
	Feb 2018	Proprietary Automated Product Recommendations platform uses AI and visual search to provide product recommendations	Angel \$1.5m	N/A
 图麟科技 TUNLION TECHNOLOGY	Dec 2017	Provides technology services leveraging AI such as image search and vision recognition	Series A \$37.8m	Shenzen Co-win Venture Capital Investments, Tianjin Hongwei Shangcheng Management Consulting Co.
 MARKABLE SHOP ANY PHOTO™	Aug 2017	Develops a visual search technology in fashion that connects photos and products	Series B \$2.6m	Infinity Ventures, Alumni Ventures Group, Plug & Play Ventures, Plum Alley, Foxcroft Enterprises
 syte	Jul 2017	Visual AI technology provider of image search for e-commerce, improving site navigation, product discovery, and user experience	Series A \$8.0m	NHN Investment
 CORTEXICA VISUALLY EMPOWERING BUSINESS	Apr 2017	Provides cloud-based image recognition systems and mobile visual search technology	Growth \$2.5m	Touchstone Innovations
 GROKSTYLE	Apr 2017	Develops visual search recognition software for furniture and home decor	Angel \$2.0m	Canaan Partners, Amino Capital, Neuron.VC

Key private placements in Visual Search

Company	Date	Description	Round Details	Investors
 clarifai	Oct 2016	Provides advanced image recognition systems for detecting near-duplicates and visual search	Series B \$30.0m	Menlo Ventures, QUALCOMM Ventures, Lux Capital Management, Union Square Ventures, Osage University Partners
 Viscovery	Oct 2016	Operates as a cloud-based image recognition technology company	Growth \$10m	China Development Industrial Bank
 netra	May 2016	Develops visual intelligence and visual search applications to automate understanding and sense-making of pictures and videos	Seed \$2.4m	Launchpad Venture Group, Zerkova Ventures, Mark Cuban Companies, Berwind LLC
 CloudSight	Apr 2016	Specializes in image recognition and mobile visual search	Growth \$1.5m	Group of 47 investors
 FASHWELL	Dec 2015	Develops and operates a visual search and recommendation platform for fashion content	Seed \$1m	NA
 JustVisual	Nov 2015	A technology company that provides visual search services for mobile and web applications	Growth \$3.5m	Xenia Venture Capital
 PARTPIC	Jun 2015	A visual recognition technology company that allows users to save time and money searching for replacement maintenance, repair and operations (MRO) parts	Seed \$1.5m	Anger Round Capital Fund, The Jump Fund