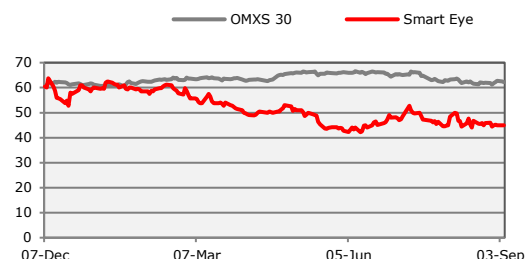


Summary
Smart Eye (SEYE.ST)
Alert leader in an awakening market

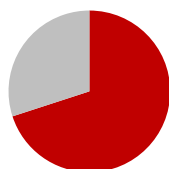
- Smart Eye provides eye tracking software for the most advanced applications, especially within automotive but it also addresses customers in defence, aircraft and academic research.
- Due to traffic safety and semi-autonomous cars the demand for driver monitoring is about to explode with an expected CAGR growth of 201 percent until 2025. Following 18 years of focus dedicated to this very area Smart Eye is in pole position, as proven by its design wins and strong connections with the German car OEMs who sell 75-80 percent of all premium cars globally.
- We initiate coverage with a base case valuation of SEK 76 per share. Our reasonably pessimistic and optimistic scenario implies a value of SEK 26 and SEK 156 respectively. A continuing stream of new design wins will drive the share price.

List:
Market Cap:
Industry:
CEO:
Chairman:

First North
446 MSEK
Autotech
Martin Krantz
Anders Jöfelt

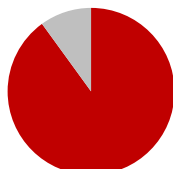

Redeye Rating (0 – 10 points)

Management



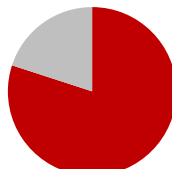
7.0 points

Ownership



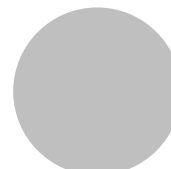
9.0 points

Profit outlook



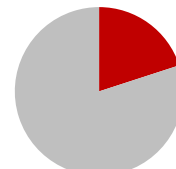
8.0 points

Profitability



0.0 points

Financial strength



2.0 points

Key Financials

	2015	2016	2017E	2018E	2019E
Revenue, MSEK	38	41	53	86	156
Growth	13%	8%	31%	62%	80%
EBITDA	-2	-11	-20	-10	41
EBITDA margin	-6%	-26%	-38%	-12%	26%
EBIT	-3	-11	-30	-22	28
EBIT margin	-7%	-27%	-57%	-25%	18%
Pre-tax earnings	-4	-12	-31	-23	28
Net earnings	-4	-12	-31	-23	28
Net margin	-10%	-30%	-58%	-26%	18%
Dividend/Share	0.00	0.00	0.00	0.00	0.00
EPS adj.	-0.57	-1.52	-3.11	-2.22	2.71
P/E adj.	0.0	-39.5	-14.5	-20.3	16.6
EV/S	0.2	10.7	8.0	5.3	3.0
EV/EBITDA	-3.2	-40.9	-20.9	-45.4	11.3

Share information

Share price (SEK)	45.0
Number of shares (m)	9.9
Market Cap (MSEK)	446
Net debt 17E (MSEK)	-20
Free float (%)	84 %
Daily turnover ('000)	15

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Redeye Rating: Background and definitions

The aim of a Redeye Rating is to help investors identify high-quality companies with attractive valuation.

Company Qualities

The aim of Company Qualities is to provide a well-structured and clear profile of a company's qualities (or operating risk) – its chances of surviving and its potential for achieving long-term stable profit growth.

We categorize a company's qualities on a ten-point scale based on five valuation keys; 1 – Management, 2 – Ownership, 3 – Profit Outlook, 4 – Profitability and 5 – Financial Strength.

Each valuation key is assessed based a number of quantitative and qualitative key factors that are weighted differently according to how important they are deemed to be. Each key factor is allocated a number of points based on its rating. The assessment of each valuation key is based on the total number of points for these individual factors. The rating scale ranges from 0 to +10 points.

The overall rating for each valuation key is indicated by the size of the bar shown in the chart. The relative size of the bars therefore reflects the rating distribution between the different valuation keys.

Management

Our Management rating represents an assessment of the ability of the board of directors and management to manage the company in the best interests of the shareholders. A good board and management can make a mediocre business concept profitable, while a poor board and management can even lead a strong company into crisis. The factors used to assess a company's management are: 1 – Execution, 2 – Capital allocation, 3 – Communication, 4 – Experience, 5 – Leadership and 6 – Integrity.

Ownership

Our Ownership rating represents an assessment of the ownership exercised for longer-term value creation. Owner commitment and expertise are key to a company's stability and the board's ability to take action. Companies with a dispersed ownership structure without a clear controlling shareholder have historically performed worse than the market index over time. The factors used to assess Ownership are: 1 – Ownership structure, 2 – Owner commitment, 3 – Institutional ownership, 4 – Abuse of power, 5 – Reputation, and 6 – Financial sustainability.

Profit Outlook

Our Profit Outlook rating represents an assessment of a company's potential to achieve long-term stable profit growth. Over the long-term, the share price roughly mirrors the company's earnings trend. A company that does not grow may be a good short-term investment, but is usually unwise in the long term. The factors used to assess Profit Outlook are: 1 – Business model, 2 – Sale potential, 3 – Market growth, 4 – Market position, and 5 – Competitiveness.

Profitability

Our Profitability rating represents an assessment of how effective a company has historically utilised its capital to generate profit. Companies cannot survive if they are not profitable. The assessment of how profitable a company has been is based on a number of key ratios and criteria over a period of up to the past five years: 1 – Return on total assets (ROA), 2 – Return on equity (ROE), 3 – Net profit margin, 4 – Free cash flow, and 5 – Operating profit margin or EBIT.

Financial Strength

Our Financial Strength rating represents an assessment of a company's ability to pay in the short and long term. The core of a company's financial strength is its balance sheet and cash flow. Even the greatest potential is of no benefit unless the balance sheet can cope with funding growth. The assessment of a company's financial strength is based on a number of key ratios and criteria: 1 – Times-interest-coverage ratio, 2 – Debt-to-equity ratio, 3 – Quick ratio, 4 – Current ratio, 5 – Sales turnover, 6 – Capital needs, 7 – Cyclicity, and 8 – Forthcoming binary events.

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Glossary

In this part we have set out to explain some of the most common technical expressions and automotive industry specific acronyms used in this report. However, we expect the reader to be familiar with stock market lingo and thus understand words like ASP, TAM, CAGR and P&L etc.

AD - Autonomous Driving
ADAS - Advanced driver-assistance system
AI - Artificial Intelligence
AUD - Australian dollar
AS - Applied Solutions (A Smart Eye business segment)
FCA - Fiat Chrysler Automobiles
DMS - Driver Monitoring System
GM - General Motors
MLB Evo - The name of an Audi/Volkswagen platform
OEM - Original Equipment Manufacturer
PSA - Peugeot Société Anonyme
RFQ - Request for quotation
RI - Research Instruments (A Smart Eye business segment)
SMI - SensoMotoric Instruments
SPA - Scalable Product Architecture
SUV - Sport Utility Vehicle
VGA - Video Graphics Array

Investment thesis

Smart Eye provides eye tracking software for especially automotive applications but addresses customers in defence, aircraft and academic research as well. The Company is listed on Stockholm Stock Exchange (First North) since year 2016.

Investment Case

- **In pole position within eye tracking for autonomous cars**
- **Impatient & short term focused stock market**
- **Design wins to move the share price**
- **Attractive risk/reward profile**

In pole position within eye tracking for autonomous cars

Courtesy of the (semi) autonomous cars and traffic safety, the market for driver monitoring systems (DMS) is about to explode with an expected CAGR volume growth of 201 percent during 2017-2025. This expected growth is a well-known fact but we believe many do not understand Smart Eye's strong positioning. Smart Eye has devoted 18 years to this very niche (whereof 16 years of actual sales) and e.g. invested SEK 70 million in CAPEX (and even more over the P&L) during only the last four years. Consequently, Smart Eye is in pole position, as proven by its design wins win ratio of 50 percent (3 out of 6). It is not just the 50 percent win ratio that is important though. Smart Eye has a strong bridgehead in Germany where BMW, Mercedes-Benz-Benz and Audi together sell about 75-80 percent of all premium cars worldwide, which is important as the 8-9 million premium cars are first in line to have driver monitoring. Competition is limited to one other player and the customers' own solutions. However, we believe it is unlikely that the customers in the long run are willing to put up with all investments and maintain the focus necessary for in house sourcing.

Impatient & short term focused stock market

Smart Eye's first design wins with new customers are in general worth a lot more than meets the eye as they in general are platform based. The platforms should usually (although not automatically) yield additional new car models for every year over the platforms' lives. For Smart Eye this creates a very foreseeable and stable revenue stream for many years to come as the large switching costs provide solid barriers to entry. The stock market however, as always, only sees the coming few quarters, meaning significant potential for long term investors.

Design wins to move the share price

Given the car OEMs struggle to roll out semi-autonomous cars around 2020 we expect a steady news flow going forward with design wins from already won procurements as well as RFQ's in progress, which should drive the share price. If the market forecast of 2.6 million cars by 2020 should hold we believe we should see around 40 more design wins within the next quarters as one car model on average means volumes of 50 000. We would especially like to see design wins outside of Germany in e.g. Japan or US.

Attractive risk/reward profile

In relation to our reasonably pessimistic scenario of SEK 26 per share and our base case of SEK 76 today's share price provides attractive risk/reward with a larger upside than downside.

Bear points

In this subsection we acknowledge and rank the, according to us, most serious risks and counter arguments against our investment case, for serious investors to keep an eye on.

- **Market delays**

We believe the forces promoting autonomous driving (AD) and Advanced driver-assistance systems (ADAS) are too strong for the self-driving cars not to happen but we see a possible risk in several years of market delays due to e.g. legislation setbacks or lethal collisions related to self-driving cars. This could cause a more cautious approach to autonomous driving from the customers and delay their investments. There is currently no legal restrictions related to semi-autonomous vehicles but for instance Ford has warned for the risk of people dozing off in semi-autonomous cars, meaning drivers are not able to take over the driving in time when they need to. We believe delays in the market roll-out could cause a need for dilutive capital raising.

- **A substantially smaller car fleet**

A world where fewer people own a car and autonomous, electric cars live longer and are shared in car pools ("transport-as-a-service") could mean a lot less cars on the street. However, it should be noted that this is not consensus at the moment among players in the industry or market analysts.

- **Technology risk**

We can verify Smart Eye's strong offering by the design wins but we lack understanding in exactly how and why it is winning the designs as we find it hard to evaluate the technology. Thus, there is a risk that we might miss eventual technology shifts with negative effects until it is too late.

Company description

Background & position of today

Smart Eye has been focusing on automotive eye tracking software since it was founded in 1999 by its current CEO Martin Krantz. Consequently, as we will outline below, it has a key position in software for self-driving cars¹ and Advanced Driver-assistance Systems or so called ADAS. The Company is located in Gothenburg but has recently opened an office (key account managers and technical support but not straight R&D) in Detroit close to the automotive OEMs. Smart Eye is in a strong growth and expansion phase and at the moment plans to open at least one more office. Sales reached SEK 41 million in 2016 following a CAGR growth of 33 percent since 2013. The average number of employees is about 50 compared to 30 two and a half years ago. The employees are basically all working to deliver on specific customer projects, meaning more recruiting is expected as the company continues to grow.

The eye tracking product

First, a few words on the definition of eye tracking. Eye tracking technology identifies, understands and predicts human actions and intentions by studying a person's eyes. Thus, eye tracking can draw conclusions regarding an individual's level of alertness, consciousness, attention and mental status. In short, the technology uses infrared light to create reflections in the corner of the eyes that is then captured by cameras and analysed by algorithms and software. For more details on the technology see the footnote below.²

Management

Management primarily consists of engineers (mostly from Chalmers). As mentioned, the founder is still the CEO of Smart Eye but he is far from the only one who has served the company for a long time. On average, the management team has been 11 years at Smart Eye and 65 years in total. We believe having employees staying this long is a crucial factor in building a successful company. Overall, insiders in the Board and Management hold a lot of shares, which is positive as it will align objectives and make employees feel more like partners and less like employees. Also worth mentioning in this context is the incentive program where all employees were offered options before the listing and in total subscribed for over 90 percent of the shares in this incentive program. Our conclusion is that

*Experienced Management
and a good incentive
structure*

¹ In the following we will use the term autonomous or self-driving cars and by that we also mean semi-autonomous. See also the different levels of autonomous driving in the market section.

² Following the camera capturing the reflections from the eyes, intelligent algorithms separately identify the iris and pupil of each eye and weigh these feeds into a consensus gaze. At the same time, the software detects, tracks and interprets the facial features and head movements of the person. Over time the AI (artificial intelligence) algorithms gets accustomed to the face of every individual and build a detailed profile for each person, meaning the system can accurately determine the head pose despite partially obscured faces from sun glasses etc.

Smart Eye seems to have the right talent and experience in place, in order to reach the Company's objectives. To read more about the management people and [to see their bios go to the appendix](#).

Ownership

We have rated Smart Eye's ownership structure a strong 9 out of 10 (read more in the [Redeye Rating section](#)), especially as the company is run by owner operators. The founding family together controls about 20 percent of the total shares.³ The second largest owner is the Jöfelt family with over 17 percent in total. Anders Jöfelt, active on Board, owns an 8.7 percent stake (To read more on Jöfelt and the rest of the overall experienced Board [see the appendix](#)). Fouriertransform, the state owned VC firm, is the third largest shareholder with a 16 percent position (see the ownership table on [the third last page](#)). Fouriertransform has invested in other automotive companies as well and should have good experience in this area. One last thing worth mentioning is that there are institutions on the top 10 owners list such as e.g. Handelsbanken Fonder. All in all, Smart Eye in our opinion has a very solid ownership structure.

A strong ownership structure where the founding family controls 20 % of the shares

Business areas & business model in short

Smart Eye has hundreds of customers and many of these relations are more than a decade old. The image below is just a selection.

A selection of Smart Eye's customers



Source: Smart Eye

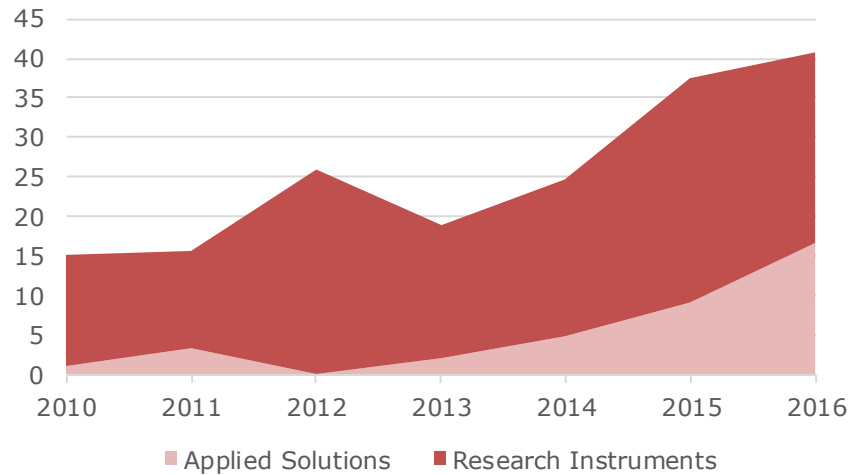
Smart Eye's two business areas are Research Instruments (RI) and Applied Solutions (AS). The application areas are numerous (see e.g. Tobii) but Smart Eye, as we will see in the next section, is especially focusing on providing its eye tracking software for the most complex and demanding multi camera systems for automotive. The AS business area is an OEM business where Smart Eye provides tier 1 automotive suppliers with algorithms and software for embedding eye tracking in products that are later sold to the car OEM manufacturers.

The RI segment is primarily focusing on selling advanced eye tracking systems (incl. hardware & software) for analysis of human behaviour in academic research, the aviation/defence industry but in automotive as well.

³ Parts of the holdings are pledged as collateral for a Smart Eye loan and may therefore not appear in public ownership tables.

Focus during the last years has shifted from RI towards the growing AS segment, as indicated by the sales graph below.

Sales per segment



Source: Smart Eye

We will return to these two business areas and their markets etc. in separate sections further below. As we have based our investment case on the AS business the first four sections on business model, market, value chain and competition respectively are only related to the AS business. The RI segment is then presented in a separate section.

Business model & the customers

Even though it is just recently with the buzz around self-driving cars that Smart Eye was put on the map Smart Eye has been in the automotive space during a very long time. Saab Automobile was the first customer back in 2001. Following Saab, General Motors (GM), Delphi, Ford and the German car OEMs one by one came on board. Then came the financial crisis, which was as major a blow for Smart Eye as for the automotive industry as a whole. Volvo laid off one fourth of its engineers and GM went bankrupt etc. Smart Eye and its main competitor since the beginning, Seeing Machines, decided to face the financial crisis in different manners. Smart Eye maintained its automotive focus on the premium passenger cars and shifted resources to the research projects where it won market shares from Seeing Machines. Seeing Machines on the other hand moved more and more into other segments like e.g. mining and fleet and started providing aftermarket solutions for trucks (read more on Seeing Machines in the [competition section](#)).

Business model

In the AS segment the cameras and the other hardware parts are produced by the tier 1 suppliers like e.g. Bosch and Delphi or their tier 2 partners. At the moment, most tier 1 companies do not have their own eye tracking software, meaning they procure this from external vendors such as Smart Eye. How it works is that Smart Eye participates in procurements together with at least one tier-1 player. As Smart Eye is independent it can make offers with multiple tier 1 players for the same contract, which increases the chances to win.

Basically, the car OEM tests if the solution in reality does really match the specs on paper with regards to sunlight and environment etc. If Smart Eye and the tier 1 partner hereafter win and get a so called design win⁴ their solution is usually later integrated in the car model, provided the car model is launched and not discontinued. However, it is important to note that design wins are not contracts and the car models can always be postponed or even cancelled.

During the period of the integration work Smart Eye receives service revenue for prototypes and validation systems. When the integration work for the platform and the first car model is done we estimate that 95 percent of the work is done, meaning lower service revenue for Smart Eye. However, when the finished car models later are rolled out Smart Eye starts making the big money as it then also receives a royalty license fee per car with 100 percent margin. After the launch of a car model Smart Eye is usually allowed to announce the car model when the deal has been signed by its purchasing department.

The business model is based on licenses (royalty), i.e. 100 % margin

⁴ When Smart Eye refers to a design win it is a contract regarding serial production of a specific car model.

At the moment the customers' work on new car platforms and new designs is intense for both Smart Eye and Seeing Machines, meaning a strong, services-related sales growth for both. Seeing Machines recently reported sales growth of over 50 percent year over year, suggesting a lot of activity in the industry and we believe this will give birth to more activity from other players.

One very important, industry specific detail in the business model is the platform strategy. Automotive OEMs face ferocious competition and the perhaps only countermove has since way back been cost efficiency. Most notably, all car manufacturers are using larger and larger (and hence fewer) platforms to share design, engineering and production efforts over a range of different car models. The objective for all car OEMs is to produce several different car models with a common set of components in the most efficient way. The platform approach can be illustrated by Volvo's SPA platform in the timetable below (please note that Volvo is currently not a customer for Smart Eye in the AS segment).

Platform strategy illustrated by Volvo's SPA platform				
Timeline:	2014	2015	2016	2017
	XC90 (gen 2)		S90	S90L
			V90	XC60 (gen 2)
			V90 CC	

Source: Volvo

The platform strategies of the car makers mean that a design win of one car model usually leads to additional design wins

When the autonomous driving (AD) and Driver Monitoring System (DMS) are procured this is usually done for a technical platform, meaning that when additional car models are to be developed on this platform the OEM is less likely to replace the AD and DMS with something completely new. When Smart Eye secures a design win from one car OEM there is therefore a large chance for Smart Eye to win this OEM's next car model too, i.e. there are strong barriers to entry ([see also the competition section](#)).

If a change in the OEM's DMS is to be made it will likely be on the first model on a new platform or the mid-life facelift. Usually one platform has at least 7 car models and one or two of the models are launched (or renewed) every year, meaning the last car model on the platform is launched in year 7 at the latest. However, some car OEMs are talking about rolling out 3-4 autonomous car models per year, which is both doable and logic in our opinion since the first movers in autonomous cars likely want to capitalize on their first mover status by initially building a strong market position. The other more cautious approach of rolling out easy and steady and instead see what the other players are doing is also possible though and pursued by some players, as we will see further below.

Smart Eye Already has all the car OEMs as customers in the RI segment

The customers

We earlier mentioned that virtually all major car OEMs since way back are Smart Eye customers in the RI segment. We believe this is a good thing even though in AS Smart Eye's customers are instead rather the tier 1 suppliers like Delphi and Bosch etc. Our understanding is that the best possible thing for a tier 2 like Smart Eye is that the OEMs request the tier 2 player's solution in their required specifications given to the tier 1 players. Therefore strong relations with the car OEMs is advantageous not to say absolutely necessary.⁵ Dual sourcing is a standard practice for all components over a certain substantial cost level but our belief is that Smart Eye currently does not pass that threshold.

Smart Eye is very well positioned for the semi-autonomous cars and consequently Smart Eye has won three out of the six design wins that we are aware of. Smart Eyes three design wins were with different customers and are all single sourced. Expected launch for the first design win from early 2015 was in summer 2017 (e.g. two and a half years lead time) and the one from 2016 is expected to be launched at the end of 2017. The third design win was won in August 2017 for a European 2019 model. As there has so far only been six completed procurements during the last years Smart Eye's win ratio is 50 percent. As for the GM Cadillac where Takata and Seeing Machines won Smart Eye entered late in the process and we also suspect that it in this case did not have a strong tier 1 as an ally. We suspect (speculatively) that the fifth design win was Denso for Toyota Lexus and the sixth one is at the moment unknown/secret.

⁵ As Seeing Machine puts it, the tier 2 (Seeing Machines or Smart Eye) educates and informs the car OEMs and hereafter the car OEMs direct the tier 2 to the preferred tier 1 and last the OEMs source the DMS (Driver Monitoring System) solution from a tier 1 with integrated Smart Eye or Seeing Machines technology.

Market & opportunity

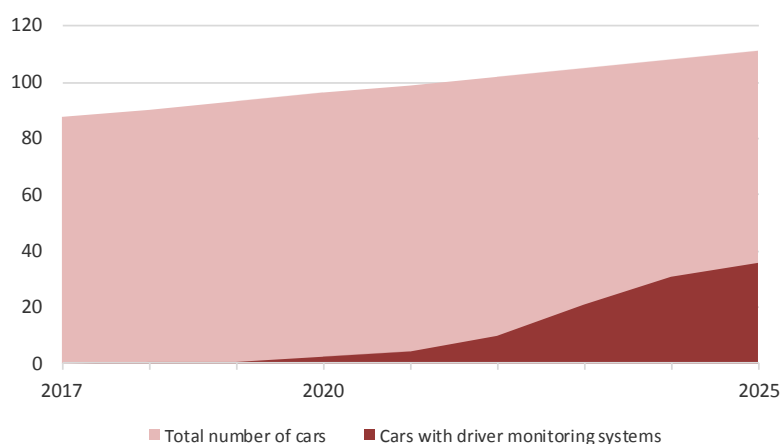
In this section we describe the size of the market, its different segments and the most important growth drivers as well as commenting on the market visibility and the timing of the inflection point.

The market size & segments

Smart Eye expects the number of vehicles with DMS to grow from 2.6 million in 2020 to 36 million in 2025 (see the graph below). This would mean skyrocketing demand as the expected CAGR volume growth would be 161 percent and 201 percent from 2017 to 2020 and 2025 respectively.

The market is expected to grow by a triple digit CAGR

Total adressable market (n.o. vehicles)



Source: Smart Eye, Strategi Analytics, Redeye Research

The expectations on the market's size seem to differ though. The TAM value for DMS is expected by Seeing Machines to be over EUR 660 million (AUD 1 billion) by 2026.⁶ This should be compared to EUR 360 million in 2025 according to Smart Eye, assuming an ASP of EUR 10 per car, i.e. no price erosion (which would be highly unlikely). However, given that Seeing Machines pursues a different strategy based on hardware sales it is not unreasonable that Seeing Machines defines the market as several times larger than Smart Eye. An ASP erosion of in total 50 percent on Smart Eye's communicated ASP of EUR 10 would mean a five times larger addressable hardware market for Seeing Machines, which would make sense and also implies that Seeing Machines also sees similar volumes of around 36 million cars in 2025. Regarding ASP pressure though it should be noted that Seeing Machines has previously declined to deliver to tier 1 players when the price levels were not attractive enough, suggesting reasonable

⁶ The smaller programs are according to Seeing Machines calculations worth about on average EUR 1 million per year as a small program contract is worth AUD 10 million. Medium and large programs yields AUD 10-25 million and AUD 25+ million.

bargaining power against the tier 1 players. We would expect the bargaining power of Smart Eye to be similar.

Consensus says total cars shipped globally will grow by 1-3 % but there are risks

Looking at the total number of cars (with and without DMS) the current installed base is about 1 270 million cars and the average life span is 18 years. However, we notice that the average lifetime of cars according to various sources could increase ahead given the rise of electric cars (computers on wheels) as these cars only have about 20 moving parts instead of the 500+ in a regular car. Nevertheless, we believe it is usually not the engine but other car parts or corrosion that is the cause of car breakdowns or scrapping. Another risk is the transport-as-a-service trend where people would share cars instead of owning them. We have seen numbers that the car utilization ratio may go from today's levels of about 4 percent to up to 10 times higher as more and more self-driving cars rented as a service drive around 24/7. Still, the consensus in market reports is that the 87 million cars sold in year 2015 is expected to increase by a CAGR of about 1-3 percent to 100 in total around year 2020. We believe the main reason is the growing middle class population where the pool of potential car owners goes from 1 to 3 billion. The self-driving cars can also be closer to each other on the road. All in all, weighing all factors above against each other we feel it is hard to predict the number of future cars sold and hence Smart Eye's TAM, meaning we have built different scenarios in our valuation.

The market can be divided into premium cars (10 % of the total), mid-level (60 %) and low end (30 %). Design wins have up until today exclusively been in the premium segment as today's launches are based on procurements from around 2014. This will continue during the next few years until 2020, meaning premium cars will drive virtually all market growth the next few years and that the highest growth as well as the inflection point for Smart Eye will likely be around 2021 when mid-level car models widely start to include eye tracking. We believe there could be other potential segments as well.⁷

Growth drivers

The three main growth drivers behind the DMS boom that we have identified and will present below are: safety, self-driving cars and user experience. All OEMs and tier 1 players are investing in DMS and we believe this is because they all have to do that in order to avoid the risk of being completely left out of the race. The soaring eye tracking penetration in cars is expected to primarily come from a safety perspective and self-driving cars but user experience is also relevant as users can use the time in the car for reading or working instead of driving.

⁷ One opportunity is trucks but we do not expect Smart Eye to address this segment at the moment as it is since way back dominated by rival Seeing Machines. Motorcycles, which are more popular than cars in many Asian countries, may also provide volume potential in the future.

Traffic safety is along with semi-autonomous cars the most important growth driver

In short, the security aspects is about saving lives as 2 million people die in car accidents worldwide every year and 21 percent of the US accidents involve a drowsy driver, according to the American Automobile Association. Assuming drowsiness is as common worldwide as in the US, drowsy drivers kill about 400 000 people per year. No wonder e.g. Volvo has a vision zero of 0 deaths in Volvo cars in 2020 in which we assume eye tracking is key.

Eye tracking technology can detect sleepy drivers from the eye movement and eyelid movement (drowsiness and fatigue detection) and warn the driver or even in the end take control over the car and stop it. The same goes for inattentive drivers by reading their gaze direction and by that determining if the driver is alert and attentive or not, e.g. is focused on his or her cell phone instead of the traffic situation. In the same manner drivers are warned with a beep or seat vibrations and if a serious situation arises, the vehicle itself can take control. In this last aspect we also see a combination of eye tracking, ADAS interaction management and AI. For instance, think of the car anticipating potentially dangerous situations and notifying the driver on these risks well in advance. OEMs are also working with various complementing technologies.⁸

Now, why is eye tracking such a crucial part of autonomous cars? The car needs to make sure that the driver is ready and capable of driving when giving back control over the vehicle. There are different levels of autonomous driving which is well described in SAE's five levels⁹ (see the table below). Most likely the cars will first handle a few functions autonomously and then gradually more and more while the driver will need to remain alert, although less and less so.

Levels of Automation for Defining Driving Automation in On-Road Motor Vehicles	
Level 0 – No Automation:	The full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems
Level 1 – Driver Assistance:	The driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task
Level 2 – Partial Automation:	The driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using info about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task
Level 3 – Conditional Automation:	The driving mode-specific performance by an Automated Driving System of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene
Level 4 – High Automation:	The driving mode-specific performance by an Automated Driving System of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene
Level 5 – Full Automation:	The full-time performance by an Automated Driving System of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver

Source: SAE International

⁸ Some complementing technologies include so called health tracking (e.g. eye colour and skin tone) as well as mood detection since e.g. unhealthy (sick) or aggressive drivers ("road rage") can be very dangerous.

⁹ SAE International has introduced a six level standard of automation for defining driving automation in on-road motor vehicles. This standard was adopted as a policy by the US Department of Transportation in September 2016.

Fully autonomous driven cars where the driver does not participate or control the car at all and consequently does not have any responsibility will take a long time, not least due to the need for a legal framework. Semi-autonomous cars however, are available as we speak. There are already cars on level 2 out in the market and in 2017 the first level 3 cars will hit the street, Audi A8 being first out. At level 3 the car performs several elements autonomously while the driver's attention is being required in certain situations. The car can help the driver to e.g. keep distance, stay on track in the traffic lanes and drive during traffic jams but the driver is required to monitor the vehicle and participate in parts of the driving and is thus also legally responsible. Semi-autonomous cars are therefore perfectly legal as they do not alter the legal responsibility.

Eye tracking is crucial when the semi-autonomous car hands over the control to the driver

Smart Eye's as well as e.g. Infineon's⁽¹⁰⁾ belief is that most cars from level 3 and above will be equipped with eye tracking as the drivers' behaviour must be registered by eye tracking so that the vehicle knows whether the driver is alert and ready to take over control of the vehicle or not. As eye tracking is such an important element of the future autonomous cars we conclude that all tier 1 companies must offer such a solution.

Last, looking at the user experience possibilities the infotainment system display can be toned down while the driver is focusing on the traffic (based on gaze direction). There are likely other coming applications in this space as well.

In order to take advantage of all the growth drivers described above the camera technology and the image quality have to be improved, which we believe will be done in two technological leaps.¹¹

Market visibility & timing

As we will outline in the next section, every OEM invests in self-driving cars and Smart Eye has previously had at least one project (not design win) with each one of them, in its Research Instruments segment (see further below). Clearly, the premium segment is paving the way as these cars are being launched now. A few years down the road, adoption will reach the mid-level

¹⁰ Infineon is a major supplier of semiconductors within automotive. See further [the competition appendix](#)

¹¹ Mono camera solutions have been available for several years but these have fewer functions related to driver gestures and eye monitoring. This means that in order to gauge the driver status for e.g. safety purposes there is a need for a multi-functional, infrared, stereo-camera based solution (i.e. cameras with two or more lenses with a separate image sensor or film frame for each lens). The German premium brands are pioneers in introducing stereo based DMS but one other German player will seek to launch a cost effective mono-based camera solution by 2020. Smart Eye's offering is a 4 camera solution with 3D cameras. At the moment VGA cameras with 480 or 680 pixels are used but two shifts are expected, first a shift to megapixels in 2021 and then eventually full HD. The better camera resolution will make various new functions available. It could therefore slow down the downward pressure on prices as megapixel cameras will make it possible to read facial expressions and emotions, meaning more accurate eye tracking. This could be important not only for security in a self driving state but also for user experience like toning down the display when the driver focuses on the road. In the third step the full HD cameras will be combined with AI like "have the driver seen this risk". This last area is an important part of the RFQs today.

segment (mass market adoption), similar to most other technologies. From 2025 to 2030 we could be looking at a very high growth if eye tracking is accepted in low end models as well. In the beginning eye tracking will likely come as an optional but Smart Eye believes that it later will be standard.

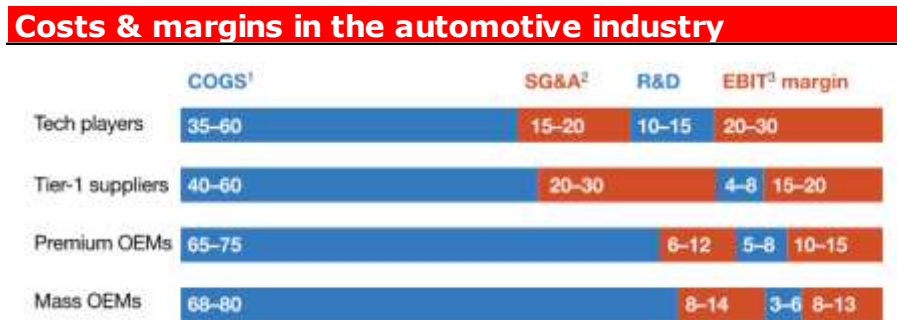
Typically, Smart Eye will know if it will be in a model 18 to 36 months before when it receives the design win. 36 months is a reasonable lead time for the first car model on a new platform but the next car model is usually faster. Seeing Machines verifies this by stating that the pipeline for the next 12-18 months will determine the launched models of 2019 and 2020. According to Smart Eye there is therefore a good market visibility in when the fully self-driving cars can arrive at the earliest. New technologies come with new platforms, meaning there is a closed window for mid-level autonomous cars now as these models will start ramping in the beginning of 2020. This means that, given the lead times, the first announcements should have come by now.¹²

¹² The procurements of today will start yielding model launches in 2020 and continue until 2025. According to Smart Eye these procurements are not so much about fully self-driving cars, meaning the roll out of self-driving cars will take time. The bulk of premium cars with self-driving mode may start at around 2030. Elon Musk's vision of an army of fully self-driving cars in just a year or two (a vision that really stands out from the other car OEMs) seems too optimistic as we interpret Smart Eye. Using Volvo's current rollout plan (see the SPA platform timeline above) as an example, XC90 comes first, then XC60 and V60 etc. and the full roll-out of all new models on the platform will not be finished before somewhere in 2020.

Value chain: OEMs & tier 1 suppliers

Now that we know that the demand for eye tracking based DMS solutions is booming let us have a look at Smart Eye in relation to the car OEMs and the tier 1 suppliers.

The distribution of profits in the automotive industry roughly follows the graph below:



Source: Thomson, McKinsey

The car OEMs

We begin by glancing at the car OEMs and their strategies in autonomous driving (AD) in order to understand who the first movers may be and then look at their tier 1 suppliers.

The OEMs and their AD investments - who leads & drives the market?

The terminologies and the descriptions used may be different but all of the car OEMs are very interested in traffic safety, driver monitoring and detecting drowsiness to prevent the many drowsiness-associated accidents we mentioned in the market section. This interest is evident from looking at the car OEMs previous focus in the area (i.e. today's DMS solutions) which shows their efforts in detecting and preventing accidents from drowsiness, although actually not yet by using eye tracking. Today's systems (see the table on the next page) are basically using combinations of forward facing cameras, steering wheel angle detection, and vehicle sensors. These legacy technologies detect erratic steering wheel movements, lane departures or change of speed for no reason.

Virtually all car OEMs are working with autonomous driving and driver monitoring

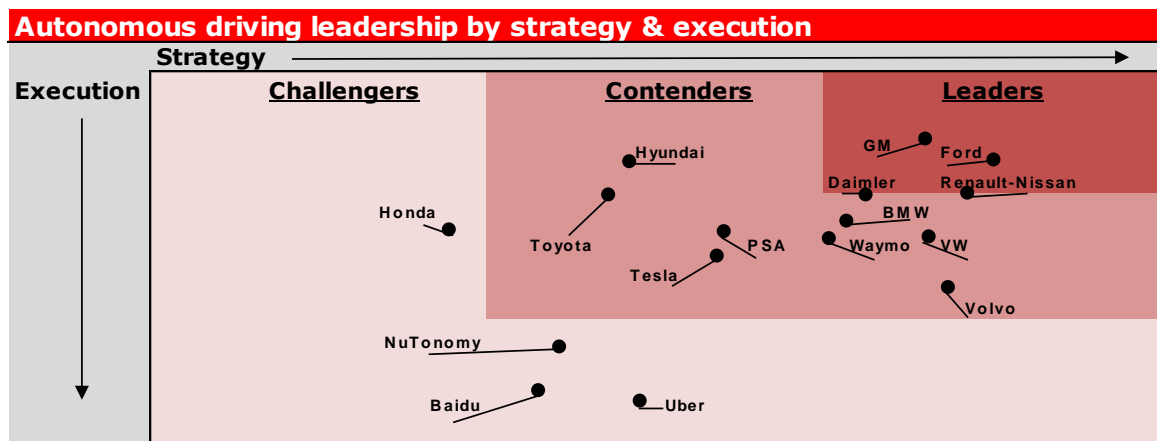
The old drowsiness detection technologies do not involve eye tracking

Today's driver drowsiness detection systems			
Car OEM	Current DMS solution	Car OEM	Current DMS solution
Audi	Rest recommendation system	Mazda	Driver Attention Alert
BMW	Active Driving Assistant	Mercedes	Attention Assist
Citroën	AFIL/LDWS	Nissan	Driver Attention Alert
DS	Driver Attention Monitoring	Subaru	EyeSight Driver Assist
Ford	Driver Alert	Volkswagen	Fatigue Detection System
Land Rover	Driver Condition Monitor	Volvo	Driver Alert Control

Source: Redeye Research & the respective car OEMs

Out of fear of getting behind, all car OEMs are involved in promoting driver monitoring and are therefore also interested in eye tracking. However, it is hard to pinpoint one of the OEM car makers as the leader but the OEMs are all trying; some a little bit more than others. The consensus view among the car OEMs seems to be that autonomous cars will hit the streets around 2020. In [the appendix](#) we have described the major OEM car manufacturers and their strategies more in detail.

Navigant Research assessed all the self-driving car players and made a leadership matrix showing who is most likely to bring autonomous cars to market first.¹³ However, the report has been criticized for e.g. using not enough criteria and putting too much emphasis on parameters that benefit the traditional car OEMs. Thus, the report is an indication of how immature the market is and illustrates the lack of consensus. Nevertheless, it still captures the big picture, showing how all car OEMs are involved in developing autonomous cars.



Source: Navigant Research, Redeye Research

We do not fully agree with Navigant as we believe the Germans are ahead of Detroit but we share Navigant's belief that the traditional car OEMs will make up for the vast majority of the AD market, at least to begin with. However, there are new players attacking such as Waymo (Google) and Tesla as well as the taxi platform companies like Lyft and Uber, although the last mentioned companies seem to prefer partnerships with traditional

¹³ The companies were assessed on the following 10 criteria: vision; go-to market strategy; partners; production strategy; technology; product capability; sales, marketing & distribution; product quality and reliability; product portfolio and staying power

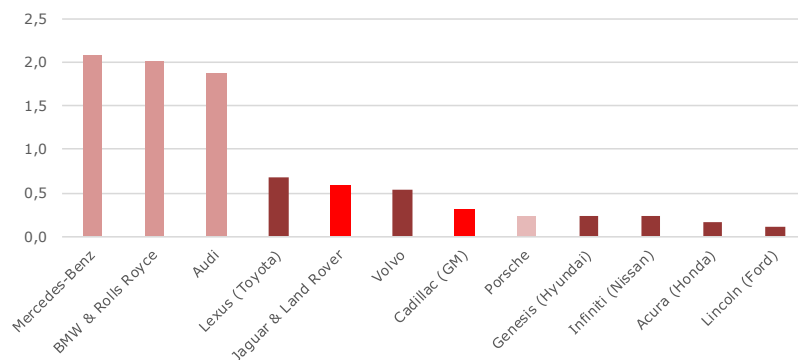
car OEMs, like e.g. Lyft and GM or Volvo and Uber (see also the appendix regarding the partnerships).

Several car OEMs have ongoing RFQs at the moment

There are numerous awaited or ongoing RFQs at the moment, especially in Germany.¹⁴ Smart Eye is in the Mercedes-Benz FO15 concept car and also has at least one other design win with a German OEM, meaning Smart Eye has a strong hold of the German market, which we believe is extremely important as the German premium brands sell about 75-80 percent of all luxury cars worldwide (see the light red/pink bars in the chart below).

BMW, Mercedes-Benz and Audi sells 75-80 % of the all premium cars worldwide

The best selling premium brands globally in 2016 (mil. volumes)



Source: Statista, Car OEM data, Redeye Research

Seeing Machines has had some success with GM in US (Cadillac) and has also been working with Jaguar (see the red bars above). We assume the Japanese premium brands (Lexus, Infiniti & Acura) are more farfetched for Smart Eye as Japan is dominated by local players like e.g. Denso and Takata and their other, different approaches (in house solutions & Seeing Machines respectively).

As mentioned, the customers' first models will use new technology platforms, meaning coming models will likely include the same eye tracking technology. The AI (artificial intelligence) technology and the instrument board in the new Audi A8 will eventually be in all Audi models, starting with A6 in 2018. We speculate that Smart Eye is integrated in Audi A8. If it is we believe there is a good chance that Smart Eye later, a few years down the line, will be in Volkswagen's autonomous vehicles as well as Volkswagen owns Audi and Audi pioneers the technology movement in Volkswagen. Audi's new platform (MLB Evo) for Audi A8 is destined for a number of

¹⁴ Seeing Machines says that one German premium brand (2 platforms) and one premium European brand (12 car models) are in RFQ mode now. It also states that two additional RFQs are coming soon in 2017 whereof one from a premium German brand (5 models) and one platform from another German car OEM. In addition, there is a procurement coming up for 12 models of a European premium brand. We know that Smart Eye is engaged in at least two European procurements with five different tier 1 players. According to Seeing Machines the two German platforms together with the other 12 European models equals about 4 million cars. The large car volumes imply that these car OEMs could only be BMW and Mercedes-Benz and/or Volkswagen.

Audi models and even some from Volkswagen as well, such as the new Touareg (a premium SUV).

The tier 1 players & their solutions

As mentioned, Smart Eye's customers are not the car OEMs but the tier 1 suppliers providing the DMS systems to the car OEMs. All tier-1 players are working with driver monitoring to various extent¹⁵, either through Smart Eye, Seeing Machines or possibly another (not yet known) competitor, alternatively their own R&D department.

The tier 1 suppliers in driver monitoring technology are especially Denso, Valeo, Bosch, Continental, Delphi and Visteon. However, there are also Autoliv, (see the separate section further below), Takata, Ficos International, Hyundai Mobis, Magna, Panasonic, Hella, Magneti Marelli, and other players as well, as can be seen in the image below (please note that these are merely examples, i.e. not all of them are Smart Eye customers although we expect Smart Eye to have longstanding relations with most of them).



Source: Redeye Research, Seeing Machines

Relations with all or most tier 1 players are needed and Smart Eye is likely in a good position here

The customer relations of Smart Eye are very old in most cases. We e.g. know that Smart Eye has been working with Visteon since at least 2008 and Delphi and Autoliv since 2002 and 2003 respectively.

Even though many of the tier 1 players historically are closely related to one specific OEM or even spinoffs (e.g. Visteon & Delphi from Ford & GM respectively) in general all major tier 1 players are working with all OEMs following a strategic focus on diversification. Today, GM and Ford are e.g. no longer Delphi's and Visteon's largest customers.

Autoliv – a strong research partner

Autoliv is not traditionally a top five player in cameras as its specialty is rather airbags and seat belts. However, given the increased focus on traffic safety and the geographical proximity we believe Smart Eye and Autoliv has a close partnership that deserves some comments, especially also in the light of the recently announced partnership between Seeing Machines and

¹⁵ Some tier 1 players have come a bit longer than others and already branded their solutions like e.g. Continental (Driver Focus) and Visteon (Hmeyer). Harman has demonstrated its own eye and pupil tracking technology that reportedly uses a proprietary algorithm to analyse the pupil reflex. Recently it was also revealed that Panasonic is working with eye tracking in its in-car drowsiness detection technology.

Autoliv. While Seeing Machine's former ally Takata (exclusive partnership) went bankrupt from the disastrous airbag recalls, Smart Eye's most relevant counterparty, aside of the German tier 1 suppliers, (albeit no exclusivity) would perhaps be Autoliv. With Autoliv's safety focus (and absence of recalls) Smart Eye obviously has backed the right horses over time compared to Seeing Machines (regarding the eventual damage for Seeing Machines in exclusively focusing on Takata for a long time instead of the other tier 1 suppliers see [the competition section](#)).

Seeing Machines needs additional tier 1 partners, i.e. the Autoliv partnership makes sense

However, recently Autoliv and Seeing Machines, as mentioned, closed a partnership deal. Given Seeing Machines seemingly wasted years of betting on the exclusive Takata partnership we do not find it strange that Seeing Machines now needs to put a lot of effort into creating closer relations with the other tier 1 suppliers, such as e.g. Autoliv. Thus, we also believe Seeing Machines will announce more tier 1 partnerships going forward. According to Autoliv, the deal with Seeing Machines is not exclusive and Autoliv can still work with Smart Eye. The deal could be seen as a sign that the market is becoming hotter.

Autoliv states that "as a technology leader, premium vehicles are especially important to Autoliv, not only in terms of sales per vehicle but most importantly as a way to introduce new technologies into the market. This is evidenced by Volvo, BMW and Mercedes-Benz who have introduced many of Autoliv's "world-first products".

Given how close Smart Eye is to Autoliv one could have a look at Autoliv's sales by customer. We note that the largest Autoliv customers are Ford, Hyundai/Kia, Nissan (11% for all three), Honda, GM (10 % each), Mercedes-Benz (8%) and Volkswagen (7%).

Other notable partnerships (NVIDIA)

NVIDIA is a Smart Eye hardware partner and NVIDIA's AI platform PX2 is also a part of e.g. Volvo's DriveMe project. In general, NVIDIA competes head to head against Mobileye that recently was acquired by Intel.¹⁶ NVIDIA has so far announced two tier 1 partnerships with Bosch and ZF. We notice that NVIDIA is working with e.g. Audi, Volkswagen, Tesla, Toyota and Ford. However, Smart Eye is hardware agnostic and complies with the processors requested by the OEMs, which in theory could be a processor from e.g. Texas Instruments, Qualcomm/NXP or Cavium. Thus, there is no guarantee that an NVIDIA car also will come with Smart Eye's eye tracking software but we believe NVIDIA's AI platform is in general involved in the process when it comes to the cars with higher level DMS – i.e. not the average level 2 cars (without eye tracking).

¹⁶ However, NVIDIA and Mobileye can coexist in cars and have done so in e.g. Tesla. In the end the car OEM decides. The car OEM can e.g. require an NVIDIA algorithm but image processing from Mobileye, although it would likely be a more expensive solution.

Competitive landscape

In this section we especially study the competition dynamics, the competitors and Smart Eye's competitive advantages.

Competition intensity in general & barriers to entry

During the past 18 years Smart Eye and Seeing Machines are the only players that have consistently invested in automotive eye tracking. Consequently, Smart Eye's only competitor, besides in house solutions, is Seeing Machines. Smart Eye has invested SEK 70 million in capex during only the past four years and a lot more over the P&L but especially thousands and thousands of man hours. Seeing Machines has also invested substantial amounts over the last few years, although not exactly as much as Smart Eye during the past four years.

The customer requirements in the automotive industry are draconic, meaning it is two different things to be number one in the lab versus in the field. The ability to cope with all light conditions is important as a system error due to e.g. switching light could cause great damage and loss of human lives.

There are strong barriers to entry in automotive

Speaking of switching, the automotive industry has high switching costs preventing suppliers from being thrown out, meaning lock-in effects and barriers to entry. It would e.g. be problematic and expensive for one of Smart Eye's customers to switch to Seeing Machines after Smart Eye has won a platform. Typically, a bit simplified and generalized, one new model, e.g. a flagship model like Volvo XC90 ([see the SPA platform example above](#)), is launched on a new platform (Once again please note that Volvo is not yet a Smart Eye customer). Subsequently, as we described earlier, there is then at least one or two new models on the platform every year through the platform's life of around 7 years and quite possibly also a facelift for most models after around 3 years. If a switch to another technology will be made it will according to Smart Eye not likely be in the facelift models but rather in the new models, given that Smart Eye does not screw up entirely.

Technological shifts represent risks of replacement (but of course also opportunities to steal business from the competitors). Automotive suppliers are for instance using the VGA based camera systems now but are at the moment planning for the next megapixel systems. Some players will skip VGA and move straight to megapixel but the trajectory of moving from less advanced cameras to more advanced ones are the same for everyone.

Main competitors

The table on the next page lists direct and indirect competitors and their approach towards automotive. Some of these companies are research companies while others are automotive suppliers looking to expand into

driver monitoring from other, adjacent automotive areas, leveraging current partnerships. We will now study some of these players in more detail.

Other (eye tracking) players & their automotive approach		
Company	Automotive focus?	
Denso	Yes	Active in automotive, primarily as Toyota's eye tracking supplier
Fotonation	Yes	Entered automotive 2015 and showcased a DMS solution with TI
EDGE3 Technologies	Yes	Primarily targets aftermarket but looks to bring a more affordable DMS for mid-level cars
Jungo Connectivity	Yes	Cisco spinoff from 2013. Claims that most tier 1s are evaluating their tech
Seeing Machines	Yes	The main competitor (see separate section)
EyeTech Digital Systems	Some	Automotive since the end of 2013
Eyetracking Inc	Some	Works with Seeing Machines but no automotive clients on the client list
iMotions	Some	Lists Honda, BMW & GM as customers. Works in e.g. biometrics so not necessarily eye tracking though
Smartdrive	Some	Mainly video analytics for commercial vehicle fleets
Can Controls	Some	Automotive focus. Not eye tracking but facial and gesture recognition. Not much info though
Lytx	Some	Mainly video analytics for commercial vehicle fleets
Applied Science Laboratories	No	No automotive offering
LC Technologies	No	Other focus. Automotive is not one of their many use cases
Mira Metrix	No	Automotive not mentioned in the many various areas of customer references
SR Research	No	No automotive related info or other stuff suggesting an automotive focus
Sensmotoric Instruments	No	Acquired by Apple for VR applications. Everything else likely to be discontinued
Tobii	No	Has stated themselves that automotive is not a focus area at the moment
Utechzone	No	Seems to specialize in other fields, majorly displays and optical inspection

Source: Redeye Research & the respective companies mentioned

Seeing machines

Seeing Machines of Australia is Smart Eye's arch enemy since inception and clearly the main competitor number one. To begin with, Australia seems like an odd location for an automotive related company as the automotive industry mainly is concentrated to US, Japan, Germany and to some extent China, France and South Korea. However, it should be noted that Seeing Machines' focus has especially been in the mining segment, most notably related to a larger deal with Caterpillar. As mentioned, Seeing Machines made a strategic decision to invest in aftermarket solutions - something it could do as it was a little bit better capitalized than Smart Eye due to entering the stock market early on.

Seeing Machine's other targeted segments have not helped the company reach profit though. The operating loss on a trailing 12 month basis totals AUD -23 million and the company thus burns a lot of cash. However, Seeing Machines targets a substantial growth and revenue of the sub AUD 100 million region by the end of 2019. We notice however that Seeing Machines did not manage to get investors on board when planning to spin off its automotive (Fovio) segment in the end of 2016 – despite a booming market. As it kept Fovio within Seeing Machines it had to raise AUD 17 million but as we understand it the company has hinted that this might not be enough to fulfil the business plan, which is likely due to the hardware business model where Seeing Machines is the self-proclaimed Mobileye of eye tracking. About half of the R&D is related to developing the silicon for the Fovio platform and processor – perhaps not the most tier 1 friendly approach. The other half of the money seems to be investments in building a larger customer base in trucks.

Main competitor Seeing Machines is coming from a different approach from a previous focus in mining and trucks

Seeing Machines has a very strong management on paper and strong connections to the US car makers

The CEO is new but the founders are still in the company, working within R&D. Management is now overall very experienced following recent additions and changes. Nick DiFiore, Seeing Machines new General Manager in Automotive (previously VP sales and Marketing), built Xilinx automotive division to a USD 150 million business and prior to that held senior engineering management roles at Ford and Visteon. Kevin Tanaka will be the new Senior Director of Marketing, coming from a similar role at Xilinx. We believe these executive people from Ford and Visteon (formerly a part of Ford) give Seeing Machines a slight advantage in winning Ford as a customer. In addition, Daniel Edmonds has joined as VP of Engineering (previously R&D GM at Continental Australia). Due to a more extensive offering to several additional verticals Seeing Machines are about 160 people – more than three times more employees than Smart Eye.

One would think that Seeing Machines is not entirely ready for the premium cars boom as it has focused on mining machinery. Nevertheless, Seeing Machines has won GM as a customer. As we understand it Seeing Machines has secured formal sourcing contracts for at least eight models (presumably high volume GM models under the follow-on contract). Seeing Machines also states that it has sourced one European brand with over 10 models. It could perhaps (but hopefully not) be related to the coming DS 7 from PSA. In addition, it works with over 10 car OEMs whereof six are related to commercial projects. 14 major car OEMs have used the research platform and tested the technology over the last seven years. It has also sold to research, mining, fleet, aviation, railroad and medical applications.

Seeing Machines has a project similar to Smart Eye's DriveMe project.¹⁷

Seeing Machines had a 15 year exclusive partnership with Takata but as the reader probably knows Takata went bankrupt from the large airbag recalls. Seeing Machines will continue to work with Takata (or its eventual successor) on the GM deal and in developing new programs together. We believe there might still be exclusivity in Japan. However, Seeing Machines has more tier 1 partnerships than the two announced ones with Takata and Autoliv.

The tier 1 competitors (Denso)

At the moment, according to Smart Eye, Denso is the only tier 1 with its own eye tracking software but nevertheless Smart Eye is still talking to Denso. The same goes for Bosch who demoed a solution at Mobile World Congress 2017 that reportedly had Bosch's own eye tracking technology. Even though Denso is owned by Toyota and the vast majority of Denso's sales (about 70 %) are related to Toyota Denso is allowed to supply Toyota's competitors. Toyota's Lexus has pioneered eye tracking since way back but

¹⁷ Seeing Machines is in the CAN Drive project where 40 Canberra drivers will be monitored while driving level 3 automated vehicles. The key issue tested in these trials is how quickly the driver can be ready to assume control of the vehicle when needed.

Denso has failed to gain traction beyond the Lexus LS flagship sedans. We assume Denso's own eye tracking solution likely means that Toyota is off limits for Smart Eye. Besides Denso and Bosch we believe most tier 1 players are trying, or at least have tried, to develop eye tracking algorithms in house.

Contenders

We have identified several contenders who target automotive eye tracking and have more or less ready solutions but so far not much traction in terms of launched car models or design wins ([see the table above](#)). We have listed and discussed these contenders in [the competition appendix](#).

Final verdict

All in all, competition is limited at the moment, meaning a great opportunity for Smart Eye to solidify its leading position. Seeing Machines is definitely a worthy competitor with a competitive product but we have identified a few issues that suggest that Smart Eye is in pole position. Australia is not an auto country and Seeing Machines's focus has therefore been, and still to a large extent is, in other areas. Seeing Machines has focused its efforts and investments mostly on mining and trucks aside of the failed partnership with Takata. We are therefore not certain exactly how ready Seeing Machines is now when the premium passenger car market is rapidly taking off. Another peculiar thing is that it was not able to spin off the automotive business despite the massive interest in automotive eye tracking. In addition, it has a heavy hardware business model that might need more capital in order to yield results.

Our conclusion regarding the competition is that Smart Eye is in pole position

Business area: Research Instruments

The sales in the Research Instruments segment (RI) has been hampered lately by the major focus on the AS business but with the money from the IPO we would expect a little more focus on RI ahead, although our investment case is fully related to AS. Below we have summarized the most important parts of the RI area.

Customers & use cases

When the automotive industry halted during the financial crisis Smart Eye's focus on defence, aircraft and academic research in the RI segment drove sales. It should be noted that the RI business area also includes automotive sales. In 2015 automotive accounted for 37 percent of RI sales and we expect that number to be higher by now. We assume there are synergies between RI and AS in automotive and we note that the new Detroit office is important for RI as well.

Aviation and defence customers use Smart Eye's technology in R&D and simulators. One prominent example of a customer is NASA that uses Smart Eye Pro in its flight simulators. Among the other customers one find about 85 universities and research institutes. Application areas include psychology, paediatrics, neurology, ophthalmology, teaching, linguistics, studies of primates and behavioural science.

As mentioned, Smart Eye has addressed automotive customers since its beginning with the first delivery to Saab Automobile back in 2001. It should therefore not come as a surprise that Smart Eye has delivered eye tracking systems to most of the World's major car OEM manufacturers. Automotive customers in the RI segment use Smart Eye to understand how users behave in a car in order to properly design the interior, instrument panels and the driving environment in general. Customers are also eager to understand more on eye tracking and how to use the technology in the future cars. All these aforementioned applications are sold by the RI segment (licenses for technology embedded in the cars will be sold in the AS segment though).

Automotive is an important area in the Research Instrument segment as well

Product offering & business model

RI specializes in complex environments using multiple, up to eight, cameras. RI targets use cases where there e.g. is lots of movement and therefore a need for several cameras, i.e. not one person sitting in a chair which would only require one camera. Smart Eye's belief is that the Smart Eye Pro system is the only technology that can cope with up to eight cameras in a robust, accurate and reliable way, in all light conditions, including darkness. Smart Eye has in total delivered about 380 systems for this kind of use.

As mentioned above Smart Eye's RI sales is based on a system offering called Smart Eye Pro, consisting of hardware (basically cameras), illumination modules and accessories, which is combined by calculation and analysis software. In addition, Smart Eye often provides installation and configuration at the customer's site. One Smart Eye Pro system costs up to SEK 1 million depending on the configuration. The high gross margin of 75-90 percent verifies that the largest part of the value is not in the hardware but in the algorithm and the software. Mainly, sales take place directly to the customers, especially in automotive, aviation and the defence industry, although distributors are also used a lot in Asia.

Competition

The competitors are the traditional eye tracking players (see the table above in the AS competition section and [the competition appendix](#)). The competition intensity is decreasing as competitors like Eye Tribe get acquired (by Facebook). One important, recent change in the market is that Sensomotoric Instruments (SMI), the market number two after Tobii, was acquired by Apple. Apple did not buy SMI for the research part but for the VR and therefore, similar to Facebook, said it will only support the customers in the research segment until year end. The overlap between Smart Eye and Tobii is not so high though and short term Smart Eye's product portfolio is what it is but the playfield is interesting long term as the market needs an alternative to Tobii.

Easing of competition as competitors are being acquired

Market size & growth drivers

Smart Eye is the third or fourth largest player. Currently Smart Eye's addressed segments in the RI market consist of academic institutions, automotive, aviation and defence. As Tobii Pro's SEK 200 million in sales equals control of about 50 percent of the market Smart Eye's RI sales would imply a market share of somewhere around 5 percent. The total market for Research Instruments is expected by Tobii and Arthur D. Little to be USD 72 million in 2016 and grow at about a 10 percent CAGR.

In short, the market growth is driven by a deeper understanding of eye tracking and its opportunities. Market research studies is one important growing segment in eye tracking that is not addressed by Smart Eye.

As mentioned, RI has not been a priority during the last years but the cash from the offering makes it possible to increase investments in selected RI areas. About 25 percent of the IPO money will be invested in RI. Smart Eye states that there are several interesting potential areas for Smart Eye Pro, namely user tests and medical applications. Another new area for Smart Eye is the partnership with Neonode and the joint subsidiary Neoeye.

Financial estimates

Our financial estimates are summarized below:

Sales estimates

We believe Smart Eye during the next years can reach a 75 percent market share among the important German luxury car makers that control 75-80 percent of the premium segment and are first movers in autonomous driving. We assume that this will mean about 1.7 million cars with Smart Eye technology in 2020. We also see a 10 percent CAGR growth until 2020 in other AS revenue driven by more designs and platform projects.

Sales assumptions: Applied Solutions (AS)					
(SEK million)	2017E	2018E	2019E	2020E	2021E
Total AS net sales	28	56	120	188	289
whereof licenses	1	26	84	149	245
whereof service & other revenue	27	31	35	40	44
<i>AS net sales growth (%)</i>	<i>69%</i>	<i>101%</i>	<i>112%</i>	<i>58%</i>	<i>54%</i>
Automotive license volumes (million)	0,01	0,27	0,89	1,74	3,23
TAM licenses (n.o. cars)	0,14	0,56	1,52	2,89	6,02
Market share of volumes (%)	10%	48%	58%	60%	54%
ASP (SEK)	95	95	95	86	76

Source: Redeye Research

As for the RI segment we expect Smart Eye to grow in line with the market and defend its market shares of about 4-5 percent (see the table below).

Sales assumptions: Research Instruments (RI)					
(SEK million)	2017E	2018E	2019E	2020E	2021E
Total RI net sales	25	30	36	40	43
<i>RI net sales growth (%)</i>	<i>2%</i>	<i>21%</i>	<i>20%</i>	<i>10%</i>	<i>9%</i>
N.o. Smart Eye Pro systems	50	60	72	79	86
TAM (SEKm)	612	673	741	815	896
Market share (SEKm)	4%	4%	5%	5%	5%
ASP (SEKm)	0,5	0,5	0,5	0,5	0,5

Source: Redeye Research

Earnings estimates

We believe that Smart Eye's employee force will have increased to about 85 people in 2020 and consequently expect total OPEX to ramp at about a 15 percent CAGR growth during 2017-2020, meaning EBIT margins of 18 and 30 percent in 2019 and 2020 respectively (see the table on the next page).

Earnings estimates					
(SEK million)	2017E	2018E	2019E	2020E	2021E
Total net sales	53	86	156	228	332
<i>Net sales growth (%)</i>	<i>0%</i>	<i>64%</i>	<i>80%</i>	<i>46%</i>	<i>46%</i>
Employee costs	-47	-56	-63	-77	-90
Avr. n.o employees	50	60	70	85	100
Other OPEX	-41	-54	-65	-75	-90
Total depreciation	-10	-12	-15	-20	-23
Capitalized work for own account	14	14	15	13	0
EBIT	-30	-22	28	69	129
<i>EBIT (%)</i>	<i>-57%</i>	<i>-25%</i>	<i>18%</i>	<i>30%</i>	<i>39%</i>
PTP	-31	-23	28	69	129
EPS (SEK)	-3,11	-2,22	2,71	6,13	9,90

Source: Redeye Research

Quarterly estimates

In our short term quarterly estimates (see the table below) we expect a solid sales growth but larger operating losses due to higher costs as Smart Eye invests following winning more design wins but also in order to solidify its strong position:

Quarterly estimates (million SEK)											
SEKm	2015	Q1'16	Q2'16	Q3'16	Q4'16	2016	Q1'17	Q2'17	Q3'17	Q4'17	2017
Net sales	37,6	5,6	10,5	10,1	14,6	40,7	7,6	12,1	15,5	18,0	53,2
<i>Sales growth (%)</i>	<i>13%</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>8%</i>	<i>37%</i>	<i>16%</i>	<i>54%</i>	<i>24%</i>	<i>31%</i>
EBIT	-2,6	-3,8	-3,9	-4,8	1,2	-11,2	-9,2	-9,3	-5,9	-5,9	-30,3
EBITDA	3,2	-2,0	-2,0	-3,0	3,0	-3,9	-7,0	-6,8	-3,4	-3,2	-20,4
PTP	-3,9	-4,2	-4,2	-5,0	0,9	-12,4	-9,3	-9,3	-6,1	-6,0	-30,8
EPS (SEK)	-0,57	-0,52	-0,52	-0,61	0,11	-1,52	-0,94	-0,94	-0,61	-0,61	-3,11
EBIT margin (%)	-7%	-68%	-37%	-47%	8%	-20%	-83%	-60%	-31%	-27%	-57%
EBITDA margin (%)	7%	-23%	-14%	-23%	15%	-7%	-63%	-44%	-18%	-15%	-38%
EPS growth (%)	-278%	n/a	n/a	n/a	n/a	221%	81%	81%	0%	-629%	105%

Source: Redeye Research, Smart Eye

Valuation

In our valuation of Smart Eye we have primarily used a discounted cash flow valuation (DCF). Apart from our base case fair value we use a scenario analysis in order to determine how Smart Eye's valuation would evolve in a reasonably pessimistic scenario (bear case) and an optimistic but still probable scenario (bull case). We complement the DCF valuation with a peer valuation of other eye tracking and software players.

DCF valuation

In all scenarios we use a required rate of return of 12.5 percent based on our Redeye Rating of the company qualities and an effective tax rate of 22 percent.

In the tables below we have summarized our estimates in our three scenarios (see further below for our more detailed assumptions)

Valuation scenarios: Differing key assumptions									
	2017E			2021E			CAGR yr 17-21E		
(SEK million)	Bear	Base	Bull	Bear	Base	Bull	Bear	Base	Bull
SALES									
Applied Solution									
Total volumes (mil.)	0,01	0,01	0,01	1,7	3,2	4,0	234%	290%	312%
ASP (SEK)	95	95	95	76	76	86	-5%	-5%	-3%
Total sales	28	28	28	176	289	397	58%	79%	94%
Research Instruments									
Total volumes	50	50	50	86	86	220	15%	15%	45%
ASP (SEKm)	0,5	0,5	0,5	0,5	0,5	0,5	0%	0%	0%
Total sales	25	25	25	43	43	110	15%	15%	45%
COSTS									
Employee cost	-47	-47	-47	-72	-90	-117	11%	18%	26%
Avr. n.o. employees	50	50	50	80	100	130	12%	19%	27%
Cost per employee	0,9	0,9	0,9	0,9	0,9	0,9	-1%	-1%	-1%
Employee cost (% of sales)	89%	89%	89%	33%	27%	23%			
Other OPEX	-41	-41	-41	-75	-90	-137	16%	22%	35%
OPEX (% of sales)	77%	77%	77%	34%	27%	27%			
Total depreciation	-10	-10	-10	-20	-23	-23	19%	23%	23%
Depreciation (% of sales)	19%	19%	19%	9%	7%	5%			

Source: Redeye Research

Valuation scenarios: Estimates summary (SEK million)						
	(SEKm)		CAGR (%) per years		Weighted avr.	Long-term (%)
	2017E	2021E	17-21E	17-24E	17-21E	
Net sales						
Bear	53	219	43%	25%	674	2,0%
Base	53	332	58%	43%	854	2,0%
Bull	53	507	76%	56%	1220	2,0%
EBIT						
Bear	-31	52	n/a	n/a	43	
Base	-31	129	n/a	n/a	173	
Bull	-31	230	n/a	n/a	423	
EBIT (%)						
Bear	-59%	24%			6%	20%
Base	-59%	39%			20%	25%
Bull	-59%	45%			35%	30%

Source: Redeye Research

Base case

Our base scenario (base case) is based on the following assumptions for 2017-2025:

In our base case we assume a CAGR volume growth for Applied Solutions of 134 percent leading up to about 12 million licenses, equivalent to one third of the total addressable market of 36 million cars. We believe Smart Eye can achieve a large part of these sold licenses by capturing a market share of around 70 percent among the market leading German premium car makers. The Germans are the first movers in the area and will therefore provide a solid platform for growing with late adopters in other countries as well.

Even though Smart Eye has a competitive offering and competition will remain limited we believe that its bargaining and pricing power against the huge tier 1 players are rather limited. We assume the ASP will decrease by a CAGR of 9 percent per year, meaning ASP will have declined 50 percent by year 2024.

In Research Instruments we assume Smart Eye can grow 11 percent, in line with the market and thus keep its current market shares of 4-5 percent.

All in all, the factors mentioned above mean a total sales CAGR growth of 25 percent during 2017-2024. As for the fixed costs we expect the number of employees to reach 100 in 2021, which together with a 22 percent CAGR growth in other OPEX translate to an EBIT margin of 39 percent in 2021. We expect that the EBIT margin could stay around those levels for a few years and then reach 25 percent as a long-term, sustainable EBIT margin.

Our DCF valuation with these assumptions indicate a **fair value in base case of SEK 76 per share.**

Bear case

The main differences in our bear case compared to our base case scenario are the following:

In our reasonably pessimistic scenario we expect a slower market growth of 84 percent in Applied Solutions compared to 101 percent in our base case from delays due to e.g. legislation setbacks or more lethal collisions (similar to but worse than the Tesla crash), meaning a more cautious approach to autonomous driving from the customers. We believe that Smart Eye in a bear case still can defend its strong position in Germany, and continuously capture about 50 percent of the volumes from the German premium car makers. However, we assume Smart Eye fails to gain meaningful traction in Japan and is not able to win business from GM or Ford, leaving the US market share at about only 10 percent.

All in all, the factors mentioned above mean a total sales CAGR growth of

43 percent during 2017-2024 and 3.4 million licenses in 2025. As for the fixed costs we expect Smart Eye to hold back on investing as the market breakthrough is delayed, meaning the number of employees will only total 80 in 2021, which together with a 16 percent CAGR growth in other OPEX translate to an EBIT margin of 24 percent in 2021. We expect that the EBIT margin could stay around those levels for a few years and then reach 20 percent as a long-term, sustainable EBIT margin.

The assumptions above indicate a **bear case value per share of SEK 26.**

Bull case

The important differences in our bull case compared to our base case are the following:

In our reasonably optimistic scenario we assume the same market shares in Applied Solutions as in our base case but we expect the market volumes to grow on average 20 percent faster per year than in our base scenario, meaning the market will have grown to over 36 million cars already somewhere in 2024. In our bull case we assume a slower ASP decline and expect the ASP to only drop to EUR 7 until 2025 as Smart Eye continues to invent and add new functions.

As for Research Instruments we expect that Smart Eye in bull case can reach its objective, meaning SEK 100 million in sales in 2020 and then, we believe, grow to SEK 160 million in 2025, equal to a 12 percent market share, compared to about 4 percent in our base case.

All in all, the factors mentioned above mean a total sales CAGR growth of 56 percent during years 2017-2024 and 14 million licenses in 2025. As for the fixed costs we expect Smart Eye to invest more in additional opportunities encouraged by its success, meaning the number of employees could reach 130 in 2021, which together with a 35 percent CAGR growth in other OPEX translate to an EBIT margin of 45 percent in 2021. We expect that the EBIT margin could stay around those levels for a few years and then reach 30 percent as a long-term, sustainable EBIT margin.

We believe these assumptions together will lead to a **bull case valuation of SEK 156 per share.**

Relative valuation

In the table below investors who enjoy relative valuation can compare Smart Eye to its eye tracking peers. We have also included a group of a few other Swedish software companies that have analyst coverage and are in similar stages or have a market cap of similar size compared to Smart Eye. However, inarguably, none of the companies in the second group is a suitable peer to Smart Eye as they are in completely different industries.

Relative valuation of eye tracking peers & other software companies											
Comp.	Mkt cap (SEKm)	P/E		EV/EBITDA		EV/S		Sales growth		EBITDA %	
		2017E	2018E	2017E	2018E	2017E	2018E	2017E	2018E	2017E	2018E
Eye tracking peers											
Seeing Machines	296	-120,2	-208,3	-2,0	-3,1	4,8	1,4	-60%	238%	-237%	-45%
Tobii	3 662	-18,5	-30,9	-32,9	-149,3	2,8	2,4	3%	15%	-8%	-2%
Avr. group 1	1 979	-69,3	-119,6	-17,5	-76,2	3,8	1,9	-28%	126%	-123%	-23%
Med. group 1	1 979	-69,3	-119,6	-17,5	-76,2	3,8	1,9	-28%	126%	-123%	-23%
Other Software peers											
Precise Biometrics	670	93,0	12,4	53,9	9,8	6,5	3,9	-12%	68%	12%	39%
Greater Than	189	-13,3	-10,4	-16,4	-14,8	21,2	15,7	147%	35%	-129%	-106%
Formpipe	755	30,3	25,5	8,0	7,3	1,8	1,7	4%	6%	23%	24%
Enea	1 291	13,8	12,0	9,5	7,7	2,1	2,0	18%	5%	22%	26%
MSAB	1 088	31,5	21,8	22,5	15,9	3,8	3,3	9%	15%	17%	21%
Clavister	412	-6,5	-9,4	-47,7	-121,4	24,7	16,7	28%	48%	-52%	-14%
Avr. group 2	734	24,8	8,6	5,0	-15,9	10,0	7,2	32%	30%	-18%	-2%
Med. group 2	712	22,1	12,2	8,7	7,5	5,1	3,6	14%	25%	14%	22%
Smart Eye	456	-14,8	-20,2	-21,4	-45,4	8,2	5,4	31%	62%	-38%	-12%

Source: Bloomberg, Redeye Research

In addition to the peer table above we also note that Intel paid USD 14.7 billion for Mobileye – an Israeli technology company focused on cameras for self-driving cars. The Mobileye acquisition was valued at 118x EV/EBITDA (trailing 12 month) and the EV/sales multiple on Mobileye's expected 2017 revenue reached about 29x. We are not saying that Smart Eye would be worth such a multiple but we find the large interest in buying autotech companies for high multiples very interesting.

Appendix 1. Management & Board

Management and ownership is according to us especially important when investing in smaller growth companies as these firms tend to depend more on individuals compared to larger companies. Below we include the bios of the management and board.

Management

CEO and founder: Martin Krantz

As Krantz founded Smart Eye 18 years ago he has for obvious reason not done much other things, except working 2 years in R&D at Samba Sensors, a company focusing on ultra mini pressure sensors for fibre optics. He owns 837 000 shares, equal to 8.4 percent of total shares

CFO: To be announced

Smart Eye recently announced that Ulrika Drotz Molin will leave the Company after only one year's work as CFO. People leaving on their own behalf is usually negative but given her short time at Smart Eye we do not believe she is key for the Company's long term prospects. Drotz Molin holds 1 000 shares.

CTO: Martin Rydberg

Martin Rydberg has been with Smart Eye since 2000, during his whole professional career and even before finishing his M.Sc. in computer engineering at Chalmers in 2001. Rydberg has had various roles in Smart Eye throughout the years and is now the CTO since 2007. Rydberg holds 41 500 shares.

VP of Research Instruments: Solmaz Shahmer

Solmaz Shahmer has a MSc of computer engineering from Tehran Azad University. She did her master thesis for her Chalmers M.S degree in Software Engineering at Smart Eye in 2009 and has been with the Company ever since in various positions. Prior to being the head of business unit Research Instruments she worked with technical support and as Sales Manager for region APAC and EMEA and Director of sales in North America. Shahmer has holdings of 7 500 shares.

CRO: Per Sörner

Similar to Rydberg, Per Sörner was one of the first employees at Smart Eye, joining in 2000 as a senior R&D engineer. Sörner owns GONK where he has performed freelance work in development and maintenance of engineering software for mechanical stress and flow calculations in process industries. The projects have included e.g. electronics design, embedded software,

power supplies and EMC issues. Sörner holds 94 000 shares.

VP of Applied Solutions: Daniel Åman

Daniel Åman joined in 2013 and is the most recent addition to the management team. Åman has been 14 years, virtually his whole career, at Ericsson. Prior to joining Smart Eye Åman was Ericsson's Head of Microwave & Mobile Backhaul Market Development. Previous roles include e.g. Head of Broadband Networks for sub-Sahara Africa and Head of Product Area Enterprise Access. Åman's holdings in Smart Eye amount to 7 000 shares.

Board**Anders Jöfelt (Chairman)**

Anders Jöfelt is the Chairman of the Board of Smart Eye since 2017 and has been on the Board since 2012. Jöfelt is currently working as Development Manager, Online Video at SVT Interactive. Jöfelt has an extensive background in software development from Ascade and Accedo. He owns 863 433 shares in Smart Eye, equivalent to 8.7 percent of total shares. The Jöfelt family together owns over 17 percent.

Mats Krantz

As the father of the founder Mats Krantz has been involved in Smart Eye since the beginning. Apart from Smart Eye Mats Krantz is a board member of Ostkustens FartygsAssistans AB and M. Irwin & Krantz AB as well as Chairman of the Board in Letter Cube Digital AB. He owns 978 134 shares privately and 180 000 shares via related parties, corresponding to 11.7 percent of total shares outstanding.

Staffan Hansson

Staffan Hansson is a board member since 2008. Hansson is the CEO of Icecon Affärssystem AB that was recently acquired by EVRY. Icecon employed 11 people at the time of the acquisition and is specializing in Microsoft Dynamics NAV. Prior to Icecon, Hansson served as a director at SYSteam. Hansson is currently also a board member of Valerius Management Consulting AB, Kommersiella Fastigheter i Väst AB, Resultat Projektledning Sverige AB and LanCom AB. He only holds 3 000 shares in Smart Eye.

Per Aniansson

Per Aniansson is a board member since 2017, representing Fouriertransform where he works as an Investment Director. Fouriertransform holds 1 309 508 shares (13.2 % of total shares). Other current appointments of Aniansson include Scibase, AAC Microtec, OssDsign AB, Renewcell and Perma Ventures. Aniansson has also

previously been a board member of Powercell and Bambora.

Magnus Jonsson

Magnus Jonsson has been a Smart Eye board member since 2014. Jonsson worked his whole career in automotive starting at Saab Automobile in 1982, which should imply a large source of important experience and networks for Smart Eye. Most recently Jonsson served as Senior Vice President Product Development at Volvo Car Corporation during 2006-2010 and prior to that Executive Director International Operations Synergies at Ford during 2004-2006. Other previous positions include board member of Kongsberg Automotive and member of Delphi Technology Advisory Council. Other than Smart Eye, Jonsson is the Chairman of Board of Powercell AB, AstaZero and BIL Sweden and he is also a board member of several other companies such as e.g. SenseAir. Jonsson only holds 3 000 shares in Smart Eye.

Lars Olofsson

Lars Olofsson is the deputy chairman since 2017. Olofsson's most prominent current board appointments include Axfood (deputy chairman) and Axel Johnson but he is also a board member of Compass Limited/Bata Shoes and Deputy Chairman of TCC Global NV. In addition, he serves as a Senior Advisor to Chairman and CEO of SICPA SA. He was previously the chairman and CEO of Carrefour Group (during 2009-2012) and a board member of Telia Sonera. He is an ex member of International Business Council, World Economic Forum. Olofsson is reputable and brings a lot of international experience to the table (although mostly in retail) following 32 years at Nestlé as Global EVP, head of Zone Europe and head of Strategic Business Units.

Appendix 2: The car OEMs & their autonomous driving strategies

Driver monitoring is still in a premature phase, meaning strategies are different and sometimes even unclear. Below we will briefly cover the approaches to DMS and autonomous cars of the largest car OEMs. These strategies will likely change a lot within a not too distant future but our primary target is just to illustrate that all players are active in the area.

In Europe, the top 5 OEMs, especially the Germans, are leading the way in developing DMS solutions. The strategies of BMW, Audi, Mercedes-Benz and Volkswagen, according to Frost & Sullivan, include drowsiness detection and eye tracking. Mercedes-Benz also targets mood detection. In the summer of 2017 Audi launched its A8 - the first level 3 car. Daimler has a lot of focus in AD (autonomous driving), ADAS and security. Mercedes-Benz (a Daimler subsidiary) in 2008 launched Attention Assist with its proprietary technology, although this solution is based on a steering angle sensor and not eye tracking. Mercedes-Benz will reportedly equip the 2017 E-Class with a standard drowsy driver monitoring system. It also says “we will underscore our leading position in the area of AD and connectivity with the launch of an updated S-Class model”.

In the US, Ford and GM has invested several billion US dollars internally and through acquisitions in autonomous driving. GM is launching the Cadillac CT6 (with Seeing Machines) and the Chevy Bolt with eye tracking. Fiat Chrysler (FCA) is a bit behind but revealed the Chrysler Portal concept at CES 2017. In 2016 FCA, as the first Google car OEM partner, announced a partnership with Waymo (formerly the Google Self-Driving Car Project) wherein it completed 100 Chrysler Pacifica Hybrid vehicles which are purpose built for fully self-driving operations. FCA has also together with BMW joined the Intel and Mobileye alliance. We suspect FCA's new partnerships likely is a way of speeding up its investments and that it thought it was more important not being left behind than giving away its data to Google.

In Japan, Toyota has long been the leader. Head tracking is included in some of the Lexus models. Honda has been a bit quiet on their ambitions but recently announced that it targets level 3 for self-driving cars in 2020 and level 4 in 2025. Similar to FCA, Honda is partnering with Waymo in order to reach its targets. Japanese/French Nissan-Renault has a clear vision for 2020 of being one of the first full-line carmakers to launch entirely safe road-going autonomous vehicles as it plans to release ten different self-driving cars by 2020. The AD system is named Pro Pilot and will be a part of Nissan Leaf.

PSA has a partnership with the start-up NuTonomy to test autonomous SUVs in Singapore. NuTonomy has already been testing its self-driving cars in Singapore since last year. Recently NuTonomy also started deploying its vehicles on public roads in Boston. In August 2016, NuTonomy launched the world's first self-driving taxi experiment, beating Uber to market. NuTonomy will integrate its self-driving software and technology into customized Peugeot 3008 SUVs. The first PSA AD vehicle, equipped with the AVA "Autonomous Vehicle for All" will likely be the DS 7 Crossback, which is logical as this is PSA's premium SUV. According to PSA these features will be available on several Peugeot and Citroen models soon after they appear in the DS 7.

Samsung and Naver along with a dozen other companies have licenses to test AD cars on the roads in South Korea. Hyundai's first self-driving car milestone was the introduction of the Highway Driving Assist system in the Hyundai Equus. The company targets highly automated driving in its cars across its range by 2020 and launch of fully-automated cars in 2030.

Last but not least, we have the Swedish work in e.g. the DriveMe project with 100 self-driving cars in Gothenburg and the Zenuity joint venture of Volvo and Autoliv. Autoliv plans to invest SEK 1.1 billion in Zenuity and will together with Volvo hire 400 new employees apart from the 200 that already joined Zenuity. Autoliv demoed its LIV system at CES with an XC90 including Smart Eye's technology.

Appendix 3: Competition

As mentioned, the number of competitors is limited at the moment although we see several contenders (see below) whereof some of them might raise to become full-fledged competitors in the future. In general, the contenders primarily seem to pursue aftermarket opportunities, likely in order to prove the technology.

Contenders

Tobii

As an eye tracking market leader in general Tobii and its view of the world is of particular interest although we do not view Tobii as a direct competitor of Smart Eye at the moment. Tobii stated in its annual report that automotive eye tracking represents a large long term market opportunity but that Tobii currently has a 0 percent automotive market share and low priority regarding this area. We are aware of previous attempts by Tobii to penetrate the automotive segment. Tobii e.g. had an advanced development project (not a design win) with an Asian player but for whatever reason was not able to deliver despite (reportedly) rather significant investments. Tobii participated in a few procurements but when it was talking about automotive it was still not very visible in the market. Our best guess is that Tobii, in that point of time, lacked the level of commitment necessary as automotive requires dedicated investments and focus over a long period. In addition, we also believe automotive requires local presence in the automotive clusters (Smart Eye is e.g. located in Gothenburg). However, automotive applications is still a research area in Tobii Tech, meaning Tobii might very well become a future competitor in a distant future.

Eye Tech Digital Systems

EyeTech Digital Systems of US boasts a 20 year experience in eye tracking engineering services. It also claims to have come up with the first “eye mouse” for Windows, the first USB eye tracker and the first mini eye tracking module. Since the end of 2013 EyeTech has a project for an automotive customer. It says it wants to boost the interest in automotive by selling aftermarket solutions.

Fotation

Fotation is a part of Xperi (formerly Tessera) and works with e.g. face detection and face feature detection. The terminology used by Fotation is similar to Smart Eye and Seeing Machines. The technology to detect driver drowsiness and distraction is called FacePower™. Fotation claims that it has the most advanced DMS system in the market. Besides being backed by big Xperi (1.3 USD billion in market cap) it has partnerships with Kyocera and Texas Instruments regarding developing intelligent automotive camera technology.

Jungo Connectivity

Jungo Connectivity of Israel, a Cisco spinoff from 2013, has also entered the DMS market pivoting from previously developing solutions for portable device connectivity in automotive infotainment. Jungo will use existing automotive chipsets, VGA cameras and off the shelf infrared LED illumination, similar to the strategy of EDGE3 (see below). Using a proprietary chipset like Seeing Machines would raise the cost, in the words of Jungo. According to Strategy Analytics, continuing use of the low resolution VGA cameras is no problem as Jungo and EDGE3 use sensor fusion to enhance the accuracy of their DMS offering. Nearly all Tier 1 vendors are evaluating Jungo's DMS technology. Jungo is gearing its business to supply OEMs but as extensive road field testing is required deployment could come no earlier than 2019 or 2020. Dialogues have just begun with insurance companies regarding the possibility of supplying fleets through the aftermarket and the eventual need for a hardware partner to support that kind of business. Semiconductor partners include Freescale (now NXP), Intel, NVIDIA and Renesas. These hardware partners come from its earlier business in infotainment connectivity.

EDGE3

EDGE3 Technologies, founded in 2005, aims to bring its systems for fleet retro fits by 2018 and then capture the OEM market after that. When the second wave of new driver monitoring systems enter the market in the mid-level cars EDGE3 argues that its sensor fusion technology at a more affordable level can reduce false positive alerts better than costlier high resolution solutions.

Infineon/Kostal

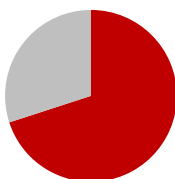
Infineon is an automotive beast and one of the top 3 vendors of semiconductors (power, sensors & microcontrollers). Since 2011, German Leopold Kostal and Infineon have been working closely together with 3D image sensor chips and 3D ToF cameras. Infineon's DMS solution is a camera-based driver assistance system that uses its REAL3 sensor and a Kostal camera system. According to Strategy Analytics, by 2018, cars with the 3D camera system from Kostal will be running off the assembly lines.

Summary Redeye Rating

The rating consists of five valuation keys, each constituting an overall assessment of several factors that are rated on a scale of 0 to 2 points. The maximum score for a valuation key is 10 points.

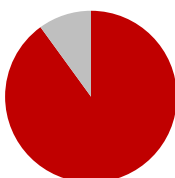
This is our first rating of Smart Eye

Management 7.0p



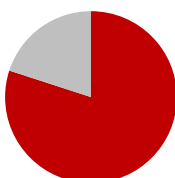
Smart Eye is governed by an owner operator as the founder is the CEO, which is positive in many ways. Compensation is moderate and just. We especially like that all employees were offered stock options prior to the listing, which could be one explanation for the low employee turnover. The solid growth trend implies that so far investments have been savvy and execution essentially flawless. Overall the Management score is hampered by Smart Eye's short period on the stock market where e.g. there is not much history of Smart Eye's communication to the shareholders as a listed company.

Ownership 9.0p



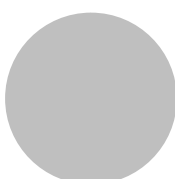
As mentioned Smart Eye is governed by owner operators where the founding family together owns about 20 percent of the company. Overall, insiders in the Board as well as Management own a lot of shares. The founding family really has put their money where their mouths are. Thus, the ownership structure is in short very appealing. Our only concern is if there are enough financial muscles to back up the Company should there be need for future supplementary investments.

Profit outlook 8.0p



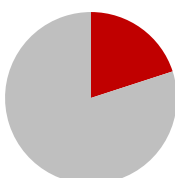
Smart Eye is the market leader in a viable niche within driver monitoring that is expected to grow at a CAGR of 201 percent until 2025, especially driven by autonomous vehicles and traffic safety. Following an 18 year focus in automotive Smart Eye has established important relations with all potential tier 1 customers. Smart Eye's automotive focus and the recurring software licenses together imply sticky and predictable revenue for the foreseeable future. In addition, high barriers to entry mean limited competition. All in all, it is a great business.

Profitability 0.0p



Our profitability rating is fully retrospective and requires consistent, positive earnings. As Smart Eye is not profitable at the moment it therefore cannot have a higher score than 0, for now. However, Smart Eye has a scalable business model with low costs, meaning the stage is set for a gradually increased rating ahead should the Company keep up its growth trend.

Financial strength 2.0p



The cash position and liquidity of Smart Eye is solid following a SEK 80 million offering in conjunction with the listing in the end of 2016. However, Smart Eye loses some points as the company at the moment has negative earnings and cash flow. In addition, there is a risk in the cyclicity of the automotive industry as the customers must be able to afford to fully embrace the new driver monitoring technology. However, the amount of customers and their respective share of total sales is reasonably diversified.

Income statement	2015	2016	2017E	2018E	2019E
Net sales	38	41	53	86	156
Total operating costs	-40	-51	-74	-96	-115
EBITDA	-2	-11	-20	-10	41

Depreciation	0	-1	-1	-1	-1
Amortization	0	0	-9	-11	-12
Impairment charges	0	0	0	0	0
EBIT	-3	-11	-30	-22	28

Share in profits	0	0	0	0	0
Net financial items	-1	-1	-1	-1	0
Exchange rate dif.	0	0	0	0	0
Pre-tax profit	-4	-12	-31	-23	28

Tax	0	0	0	0	0
Net earnings	-4	-12	-31	-23	28

Balance	2015	2016	2017E	2018E	2019E
Assets					
<i>Current assets</i>					
Cash in banks	1	62	27	0	0
Receivables	7	10	13	21	39
Inventories	2	3	4	7	14
Other current assets	2	15	8	12	15
Current assets	12	90	52	41	68

<i>Fixed assets</i>					
Tangible assets	1	1	1	2	3
Associated comp.	0	0	0	0	0
Investments	0	0	0	0	0
Goodwill	0	0	0	0	0
Cap. exp. for dev.	0	0	0	0	0
O intangible rights	39	48	58	71	86
O non-current assets	0	0	0	0	0
Total fixed assets	40	49	60	73	90
Deferred tax assets	0	0	0	0	0

Total (assets)	51	139	112	114	158
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Liabilities					
<i>Current liabilities</i>					
Short-term debt	0	0	0	0	0
Accounts payable	4	5	7	12	22
O current liabilities	13	12	14	17	22
Current liabilities	17	17	20	29	44

Long-term debt	8	8	7	12	13
O long-term liabilities	13	0	0	0	0
Convertibles	0	0	0	0	0
Total Liabilities	38	24	27	41	57

Deferred tax liab	0	0	0	0	0
Provisions	0	0	0	0	0
Shareholders' equity	13	115	84	73	101
Minority interest (BS)	0	0	0	0	0
Minority & equity	13	115	84	73	101

Total liab & SE	51	139	112	114	158
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Free cash flow	2015	2016	2017E	2018E	2019E
Net sales	38	41	53	86	156
Total operating costs	-40	-51	-74	-96	-115
Depreciations total	0	-1	-10	-12	-13
EBIT	-3	-11	-30	-22	28

Taxes on EBIT	0	0	0	0	0
NOPLAT	-3	-11	-30	-22	28

Depreciation	0	1	10	12	13
Gross cash flow	-2	-11	-20	-10	41

Change in WC	3	-17	7	-7	-12
Gross CAPEX	-9	-10	-20	-26	-29

Free cash flow	-8	-38	-34	-43	-1
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Capital structure	2015	2016	2017E	2018E	2019E
Equity ratio	25%	83%	76%	64%	64%
Debt/equity ratio	62%	7%	8%	16%	13%
Net debt	7	-55	-20	12	13
Capital employed	20	60	64	85	113
Capital turnover rate	0.7	0.3	0.5	0.8	1.0

Growth	2015	2016	2017E	2018E	2019E
Sales growth	13%	8%	31%	62%	80%
EPS growth (adj)	-279%	168%	105%	-29%	-222%

DCF valuation		Cash flow, MSEK	
WACC (%)	12.5 %	NPV FCF (2017-2019)	-70
		NPV FCF (2020-2026)	325
		NPV FCF (2027-)	448
		Non-operating assets	62
		Interest-bearing debt	-8
		Fair value estimate MSEK	757

Assumptions 2017-2023 (%)		Fair value e. per share, SEK	76
Average sales growth	49.1 %	Share price, SEK	45.0
EBIT margin	11.7 %		

Profitability	2015	2016	2017E	2018E	2019E
ROE	-26%	-19%	-31%	-29%	32%
ROCE	-14%	-16%	-28%	-25%	28%
ROIC	-16%	-56%	-50%	-35%	32%
EBITDA margin	-6%	-26%	-38%	-12%	26%
EBIT margin	-7%	-27%	-57%	-25%	18%
Net margin	-10%	-30%	-58%	-26%	18%

Data per share	2015	2016	2017E	2018E	2019E
EPS	-0.57	-1.52	-3.11	-2.22	2.71
EPS adj	-0.57	-1.52	-3.11	-2.22	2.71
Dividend	0.00	0.00	0.00	0.00	0.00
Net debt	1.09	-6.69	-2.06	1.18	1.29
Total shares	6.82	8.16	9.91	10.16	10.16

Valuation	2015	2016	2017E	2018E	2019E
EV	7.4	435.1	425.6	458.0	459.1
P/E	0.0	-39.5	-14.5	-20.3	16.6
P/E diluted	0.0	-39.5	-14.5	-20.3	16.6
P/Sales	0.0	12.0	8.4	5.3	2.9
EV/Sales	0.2	10.7	8.0	5.3	3.0
EV/EBITDA	-3.2	-40.9	-20.9	-45.4	11.3
EV/EBIT	-2.9	-39.0	-14.0	-20.8	16.7
P/BV	0.0	4.2	5.3	6.1	4.4

Share performance		Growth/year	15/17e
1 month	-9.8 %	Net sales	19.1 %
3 month	2.3 %	Operating profit adj	243.6 %
12 month	n/a	EPS, just	134.3 %
Since start of the year	-25.0 %	Equity	155.7 %

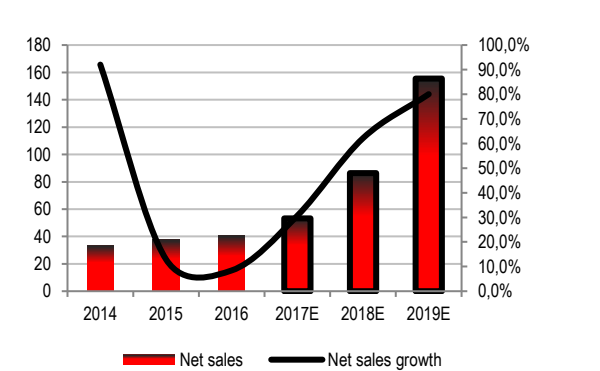
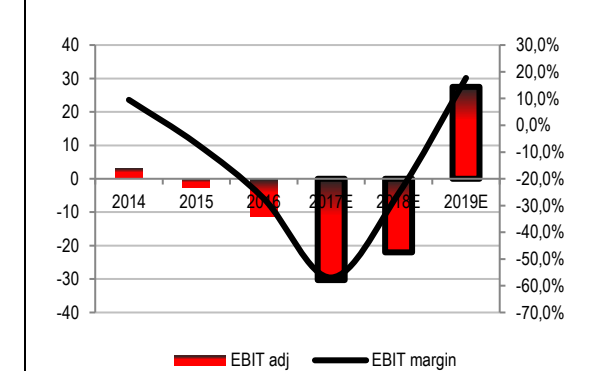
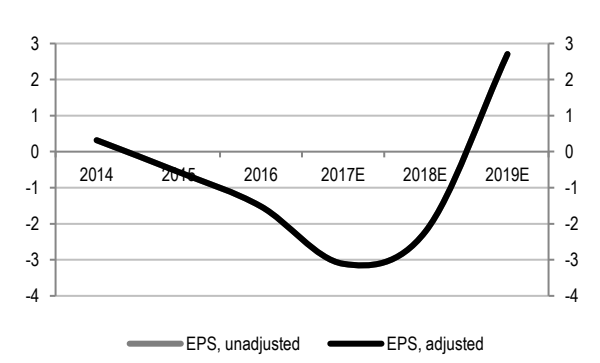
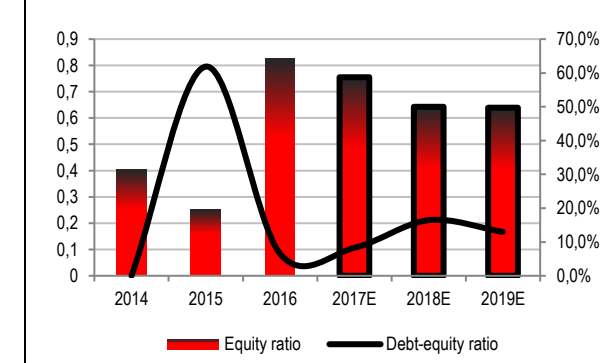
Shareholder structure %	Capital	Votes
Fouriertransform Aktiebolag	16.0 %	16.0 %
Mats Krantz	11.7 %	11.7 %
Linda Jöfält	8.7 %	8.7 %
Anders Jöfält	8.7 %	8.7 %
Martin Krantz	8.4 %	8.4 %
Stavern Helse Og Forvaltning AS	3.5 %	3.5 %
Danica Pension	3.0 %	3.0 %
Nordnet Pensionsförsäkring	2.9 %	2.9 %
Handelsbanken Fonder	2.5 %	2.5 %
Tenvik Diagnostikk Og Forvaltning AS	2.0 %	2.0 %

Share information	
Reuters code	SEYE.ST
List	First North
Share price	45.0
Total shares, million	9.9
Market Cap, MSEK	446.0

Management & board	
CEO	Martin Krantz
CFO	To be announced
IR	To be announced
Chairman	Anders Jöfält

Analysts	Redeye AB
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Revenue & Growth (%)	EBIT (adjusted) & Margin (%)
 <p>Net sales (red bars) and Net sales growth (black line) from 2014 to 2019E.</p>	 <p>EBIT adj (red bars) and EBIT margin (black line) from 2014 to 2019E.</p>
Earnings per share	Equity & debt-equity ratio (%)
 <p>EPS, unadjusted (grey line) and EPS, adjusted (black line) from 2014 to 2019E.</p>	 <p>Equity ratio (red bars) and Debt-equity ratio (black line) from 2014 to 2019E.</p>
Conflict of interests	Company description
<p>Viktor Westman owns shares in Smart Eye: No Havan Hanna owns shares in Smart Eye: No</p> <p>Redeye performs/have performed services for the Company and receives/have received compensation from the Company in connection with this.</p>	<p>Smart Eye provides eye tracking software for especially automotive applications but addresses customers in defence, aircraft and academic research as well. The Company is listed on Stockholm Stock Exchange (First North) since year 2016.</p>

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Redeye Rating (2017-09-10)

Rating	Management	Ownership	Profit outlook	Profitability	Financial Strength
7,5p - 10,0p	44	42	17	11	22
3,5p - 7,0p	71	65	99	35	45
0,0p - 3,0p	12	20	11	81	60
Company N	127	127	127	127	127

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