Global Corporate Venturing Leadership Society

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April 2018

# Corporate Venturing and the Future of Mobility, Automotive & Travel

- Has autotech peaked?
- CVCs plug into EV
- Adventures in traveltech

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leif

LEIF finds capital and customers for venture-backed technology businesses and advises corporate venture capitalists on origination and marketing. We work in the following industries: energy, materials and manufacturing, industrial IOT, automotive, mobility and travel. Since its foundation in 2010, LEIF is proud to have raised over $100m for European early and growth stage businesses. LEIF is the trading name of Carbon Communications International Ltd, which is authorised and regulated by the UK's Financial Conduct Authority.

Global Corporate Venturing Leadership Society

The GCV Leadership Society is for corporate venturing leaders and aims to be the pre-eminent provider of data, information, events and other services for the global corporate venturing community. The Society helps develop the corporate venturing leaders of the future.





# Foreword

## Tom Whitehouse
## Chairman, LEIF, and Contributing Editor, GCV

*'Why am I dressed as a hybrid super-hero (Superman and Batman)? Because venturing in the automotive, mobility and travel domains is ultimately inspired by our dreams to fly like Superman and drive a Batmobile (such are my dreams anyway).'*

By day, Tony Cannestra, Director of Corporate Ventures at Denso Corporation, disrupts automotive, travel and mobility. For example, his portfolio includes technology businesses that will enable the autonomous vehicle to see, think and respond faster than me or you. But on the way to and from work, he enjoys a more vintage travel experience at the wheel of a 2001 Yukon XL. "Yeah, I like driving," says Tony. "Vroom, vroom. It works for me". He maintains that until we get to full level 5 autonomy, we shouldn't forget that driving remains a mostly personal experience. "A lot of start-ups tend to think of personalisation inside the cabin – the radio stations, the seating position. But they now need to move to the car itself and how it responds to the driver, especially up to level 4 autonomy. (See full interview from page 21).

Is the enjoyment of driving a necessary qualification for the job of a corporate VC investing in mobility, auto and travel? Certainly not.

"I rarely drive," says Meghan Sharp, managing director of BP Ventures. "I've embraced the new model of transport. Or maybe it's embraced me." Judging by its venture investments, BP too is increasingly open to investing in new technologies that may challenge the dominance of the internal combustion engine.

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**Tony Cannestra - Denso**



**Meghan Sharp - BP Ventures**



**Bonny Simi - JetBlue Technology Ventures**

Autonomous vehicles (AV) and electric vehicles (EV) are central to BP's mobility venturing. "With AV, there's a huge opportunity to increase safety," says Meghan. "The EV market is real and emerging, and we want to create a disruptive, distinctive and differentiated offer looking at supporting that market." (See full interview from page 25).

*"We believe that the regional transportation sector,...is ripe for disruption with everything from electric 'jets' to vertical take-off and landing flying cars"*
**Bonny Simi, JetBlue Technology Ventures**

With Bonny Simi, president of JetBlue Technology Ventures, I'm more interested in what she flies and what she expects to be flying in the future, than what she drives today. That's because in addition to running JetBlue's venture unit, she remains an active commercial airline pilot.

"You will be flying on electric aircraft by 2025, if not sooner," says Bonny. "We believe that the regional transportation sector - 1000 miles or less - is ripe for disruption with everything from electric 'jets' to vertical take-off and landing (VTOL) flying cars", she says. (See full interview from page 16).

JetBlue's venturing interest goes well beyond the nuts and bolts of future flying machines into everything that defines travel. "We consider investments at the intersection of travel and technology, in a broad sense, extending beyond





airlines," says Bonny. For example, the potential of blockchain to disrupt the role of intermediaries (e.g. hotel and flight bookers) is of particular interest to Bonny and her venture team. From page 29 in "Will Blockchain Revolutionize the Travel Industry?", her colleague Alex Kaufman sets out the current and potential future disruptions.

Tony, Meghan, and Bonny are leading corporate VCs in the travel industry, broadly defined. Their parent companies, Denso, BP and JetBlue are among the most active venture backers of new innovations in the several travel, automotive and mobility sub-sectors that are tracked by Global Corporate Venturing (GCV) and LEIF. (See the spider diagrams below for examples from their portfolio).

*"A lot of start-ups tend to think of personalisation inside the cabin... But they now need to move to the car itself and how it responds to the driver, especially up to level 4 autonomy"*
**Tony Cannestra, Denso**

We are grateful to them for sponsoring this report and their participation in the GCV Leadership Society, which sets standards for our industry by, among other things, publishing reports like this, and for their participation in our workshops and conferences throughout the year.

Travel will be high on the agenda at the annual GCV Symposium in London in May. We'll be in Shanghai and Hong Kong in September, Houston in November, Monterey in January next year and several other stops en-route. BP, JetBlue, Denso and other leading corporations will be presenting their venture strategies and portfolio businesses. Please come and join them. If you're a start-up or a VC (corporate, financial, governmental or university) and you would also like to participate, please contact me.

And I'd be grateful for comments and feedback on this report. Our next edition will be out in June, when we'll focus on Chinese corporate venture capital's participation in the grand travel disruption, as well as reviewing the deals of early 2018 and news from the London GCV symposium.

Tom
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April 2018

# Executive Summary

Tom Whitehouse, Kaloyan Andonov

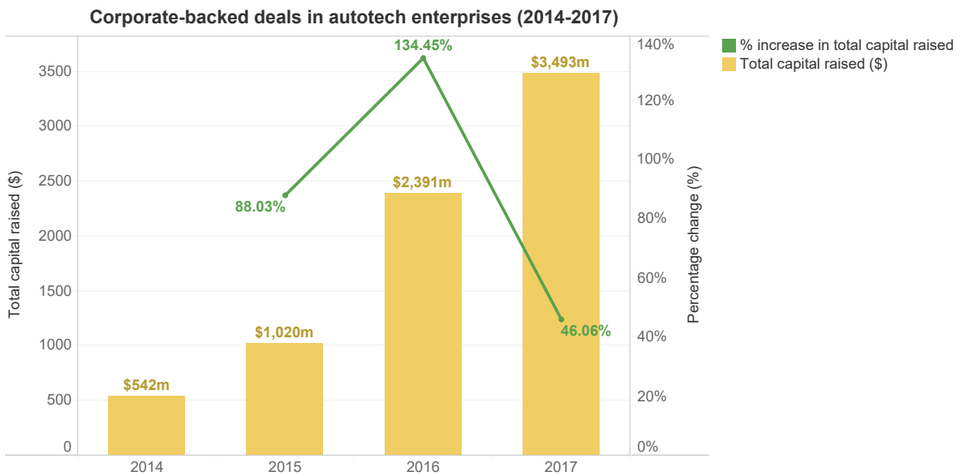
1. **CVC investment in 'pureplay' autotech by total dollar amount rose from 2016 to 2017, but the rate of increase slowed.**
   See graph 1 below

- 2017 saw a 46% increase in the total amount of corporate venture capital allocated to autotech compared to 2016. However, this is less than the year-on-year increase registered between 2015 and 2016, which was 134.45%.

- This begs the question of whether we are approaching the peak of autotech venturing.

*"Right now, it's a gold rush ... [but] I believe that we are approaching the peak. In fact, it's already getting very hard to fund a start-up in some automotive sub-sectors."*
**Tony Cannestra, Denso**

Graph 1








2. **CVC investment in autotech by deal count is also rising.**
   See below graph 2

- 2017 saw a 63% increase in the number of autotech deals being done by CVCs, compared with a 13% increase between 2015 and 2016

- EV, AV and connectivity are the fastest growing autotech sub-categories by deal count, while Lidar was flat and car insurance declined. See below graphs 3 and 4 'Autotech subcategories by deal count 2016' and 'Autotech subcategories by deal count 2017'.

*"Our next venture investments are likely to be in fast charging and we are very focused on the material technology that enables fast charging."*
**Meghan Sharp, BP Ventures**

- CVC-backed EV deals increased by 320% from 2016 to 2017 (from 5 to 21)

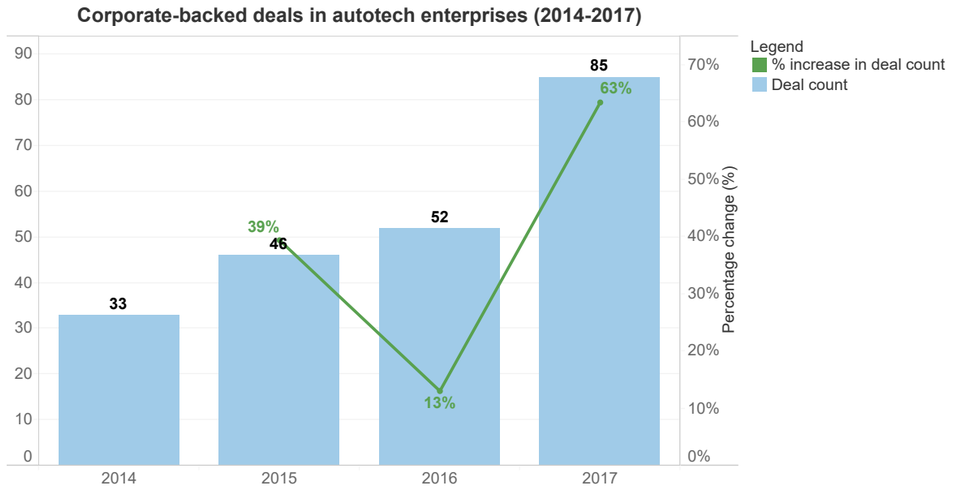
- CVC-backed AV deals increased by 60% from 2016 to 2017 (from 10 to 16)

- There were 7 CVC-backed lidar deals in both 2016 and 2017

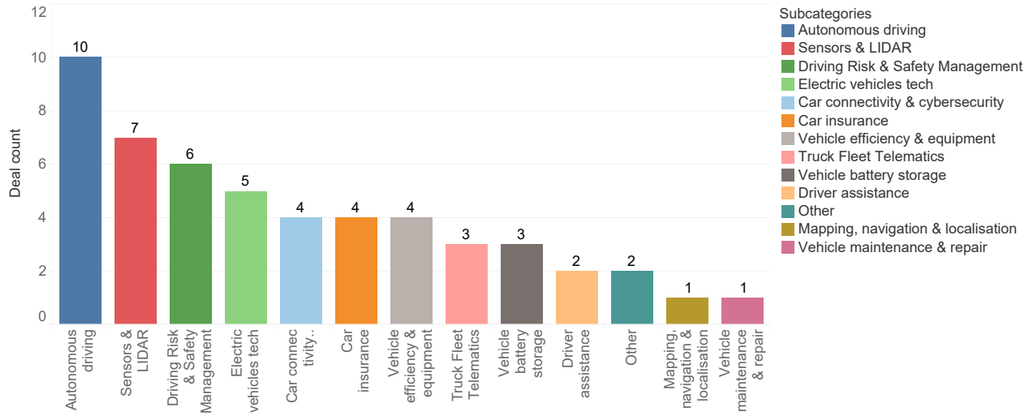
- There was 1 CVC deal in automotive insurance-tech in 2017 compared to 4 in 2016

*"We're not going to see another wave of LiDAR companies getting funded."* **Tony Cannestra, Denso**

Graph 2

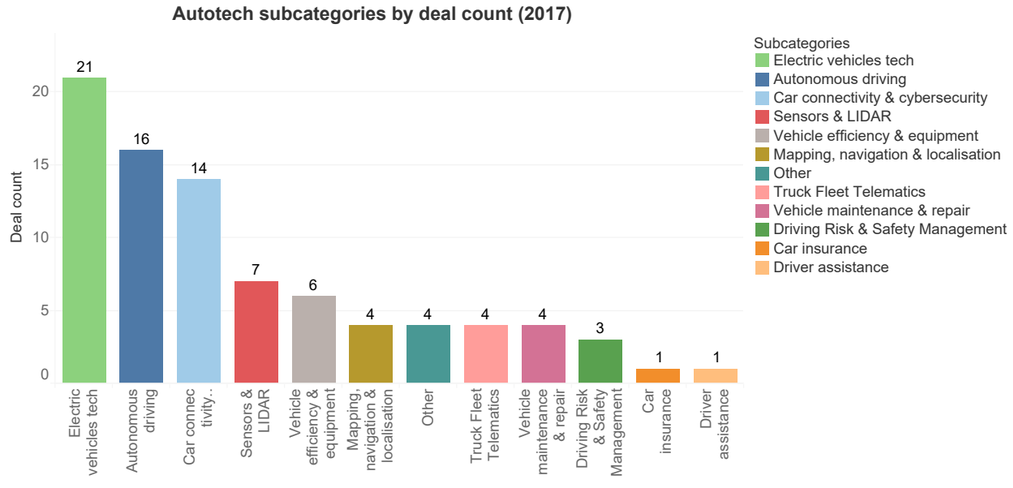


Graph 3




*"For me, the opportunity cost of driving is just too high. It doesn't make sense to be behind the wheel when I could be working."* **Meghan Sharp, BP Ventures**

Graph 4

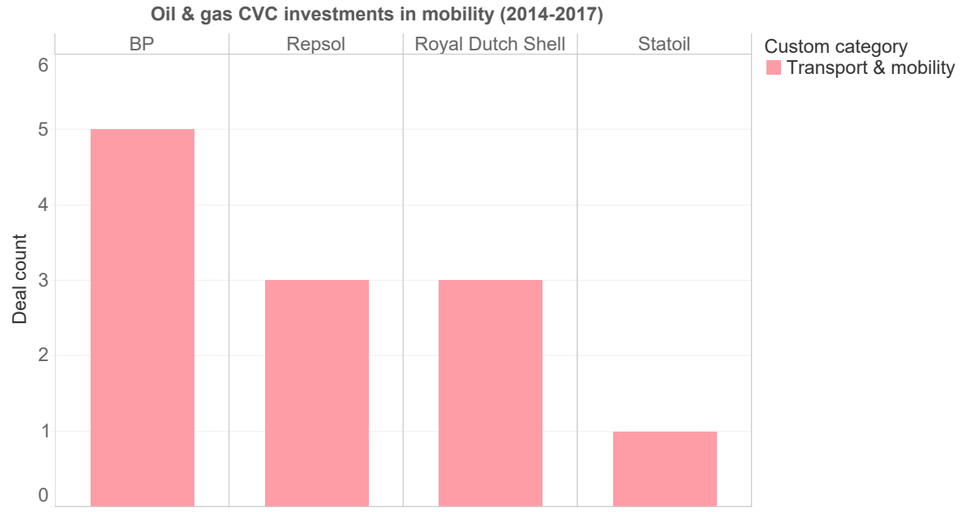





## 3. Oil & gas goes electric and mobile?

Oil & gas is just one of several industries staking a claim to the future of electric and autonomous travel. The European energy majors are all making investments while the US players appear to be sitting on the fence; a reflection perhaps of US abundance in oil and gas and the different regulatory and policy environments on each side of the Atlantic. See graph 5 below.

Graph 5




*"What are the gas stations going to be in the future? BP isn't betting that they are going to remain just gas stations. They are going to introduce more electric vehicle charging facilities at them. That's why we're really interested in fast charging."*
**Meghan Sharp, BP Ventures**

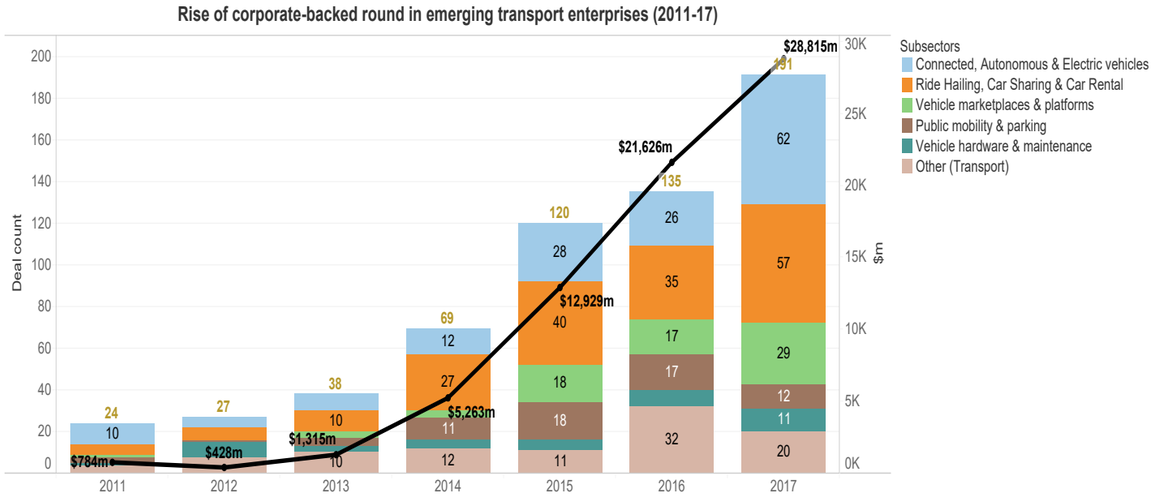
**4. The taxonomy of travel venturing is set to continue growing**

- A wider look at the mobility arena beyond 'pure-play' autotech (including ride hailing and public mobility) tells a similar story, i.e. rising volumes of capital and increasing numbers of deals. Please see below graph 6 'Rise of corporate backed rounds in emerging transport enterprises 2011-17'.

- The taxonomy of travel venturing is set to widen as the likes of JetBlue and other airlines are joined by hotels and hospitality providers to make further investments in travel-tech. An analysis by Lufthansa Innovation Hub found that travel-tech funding in the first two months of 2018 reached more than $6.5 billion across 76 deals – a pace that could bring a new record by the end of the year.

*"Just as electric propulsion is disrupting automobiles, it is doing the same with VTOL (vertical take-off and landing) for helicopters and other regional aircraft."*
**Bonny Simi, JetBlue Technology Ventures**

Graph 6



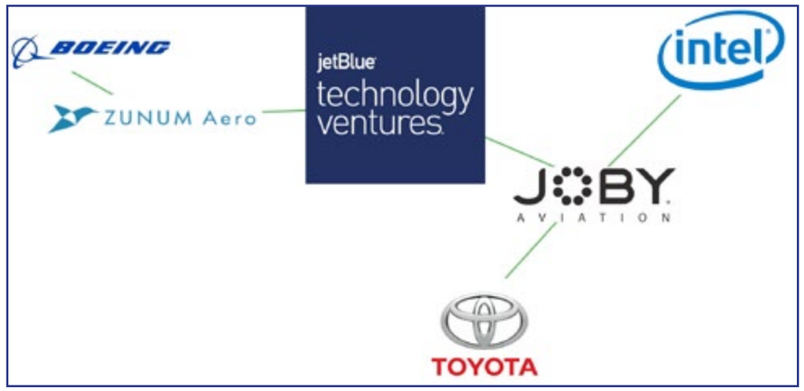

*"Ultimately, scale will prove critical in determining the success of these solutions. With scale, blockchain networks can realize their true disruptive potential."*
**Bonny Simi, JetBlue Technology Ventures**



# Case studies in CVC-backed mobility, automotive and travel innovation

Corporate venture capital (CVC) serves new technology businesses best when it increases proximity to customers and thereby accelerates their commercial success. When CVCs from different industries co-invest and collaborate, the positive impact is multiplied proportionately.

The 'spider diagrams' below highlight some examples from BP Ventures', Denso's, and JetBlue Technology Ventures' portfolios of collaboration among CVCs from the following industries; logistics, energy, automotive, software, airlines, power tools and insurance. These CVCs all want to ensure they are positively participating in the disruption of their own industries to help ensure their future survival.




In February 2018, Joby Aviation announced $100 million in venture funding from investors including Intel Capital, JetBlue Technology Ventures and Toyota AI Ventures.

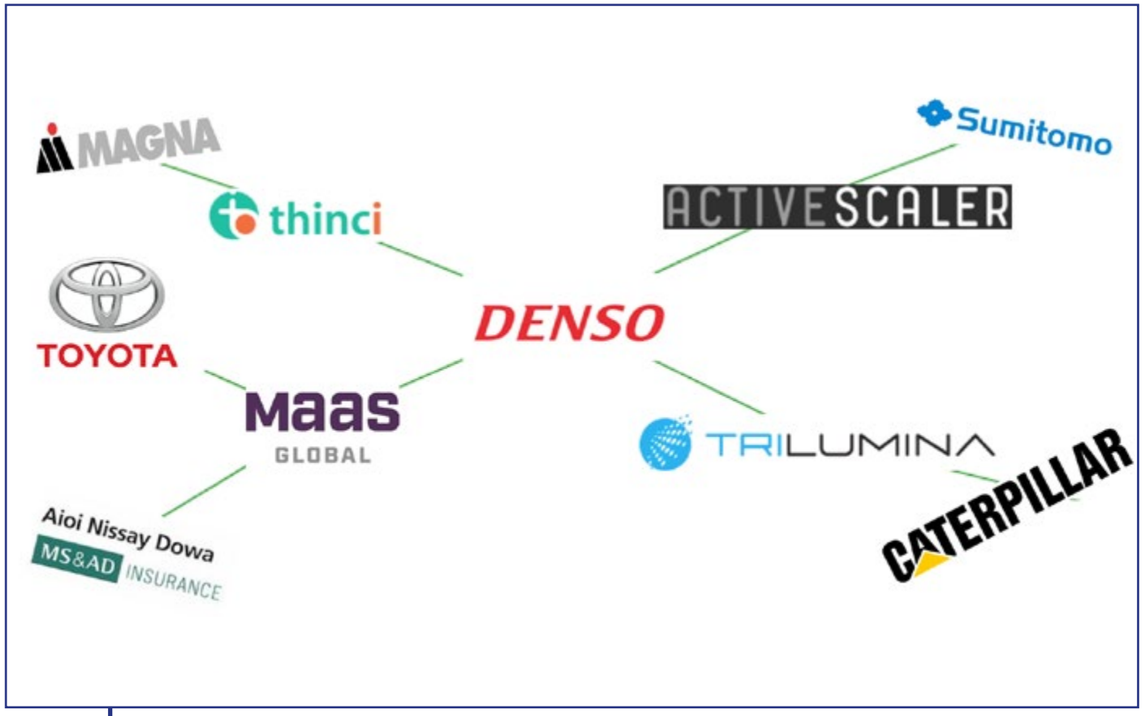
Joby is developing an electrically-powered vertical take-off and landing (eVTOL) aircraft intended to form the basis of a five-seater taxi service.

Zunum Aero is a developer of commercial hybrid-to-electric aircraft for regional transit. It raised an undisclosed sum from JetBlue Technology Ventures and HorizonX in early 2018.

*"At JetBlue Technology Ventures, we believe the regional transportation ecosystem is ripe for disruption and startups like Joby Aviation will revolutionise how people move across urban areas."*

*"We believe that the regional transportation sector (1000 miles or less) is ripe for disruption with everything from electric 'jets' to vertical take-off and landing (VTOL) 'flying cars'."*

**Bonny Simi, President, JetBlue Technology Ventures**



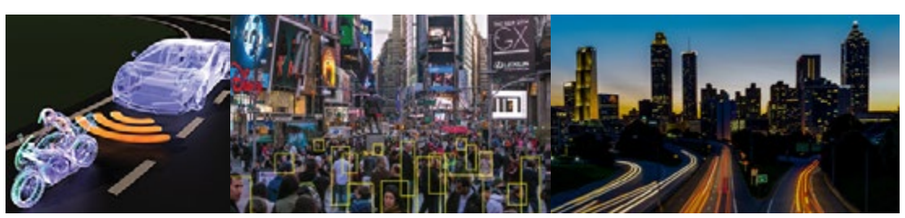

Trilumina is an Albuquerque-based company in which Denso first invested in 2016. Denso also participated in the company's $15.92m Series A round of May 2017. The benefits of company's technology include the provision of more cost-effective Lidar solutions.

ThinCi is a California-based developer of graphic chips for the automotive industry that can help autonomous and semi-autonomous cars see and 'think'. The company raised an undisclosed amount of Series B venture funding from Denso and other investors in October 2016.

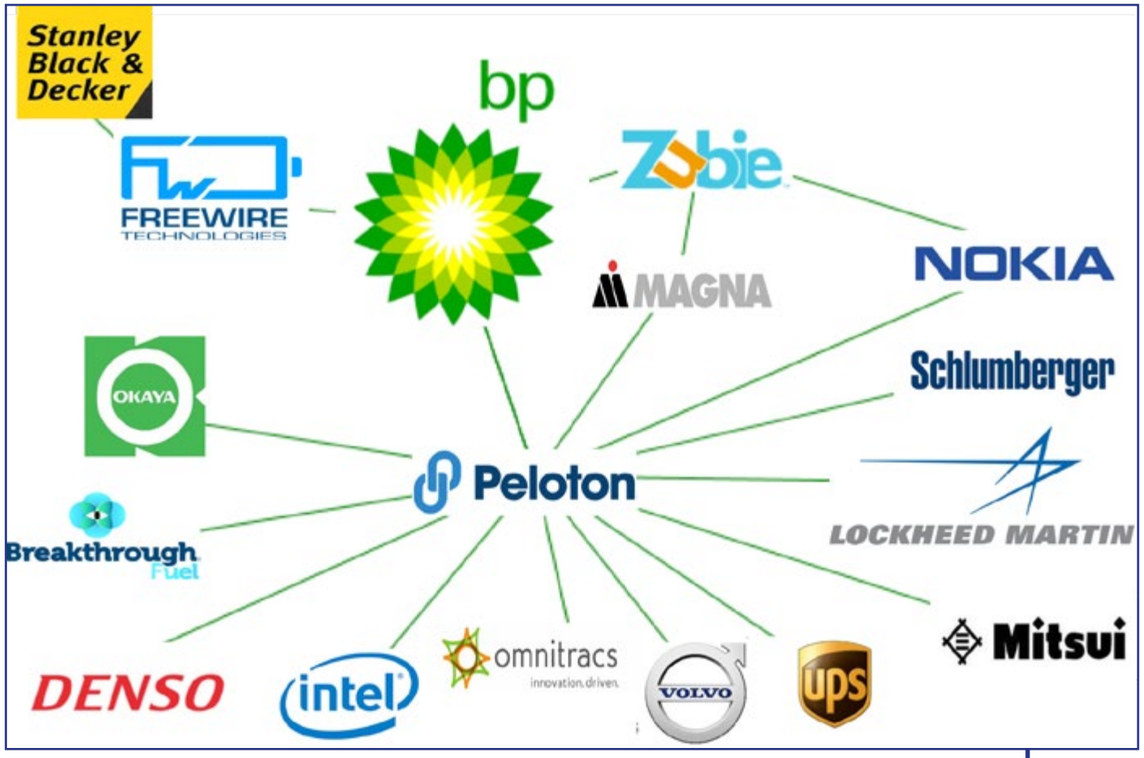
*"We believe that Trilumina's VCSEL technology is going to be a fundamental illumination technology for both driver status monitoring systems and some LiDAR solutions."*

*"ThinCI is developing a unique computer chip architecture. It's able to put deep learning algorithms on the chip itself. We're confident we'll get somewhere around 5-10 times the compute performance offered by the next best solution."*

**Tony Cannestra, Director of Corporate Ventures at Denso Corporation**








FreeWire, a manufacturer of mobile rapid charging systems for electric vehicles, received $5m in January this year from BP, which will trial its technology at selected retail sites in the UK and Europe. BP's investment was part of a $13.33 million Series A1 venture funding, which was led by Stanley Ventures, the venturing subsidiary of Stanley Black & Decker, the US power tool business.

In the summer of 2017, BP was the sole investor in the $20m Series B round of Beyond Limits, an artificial intelligence (AI) and cognitive computing company, which is commercialising software from NASA, the US space agency, and the US Department of Defence (software that was used in the Mars Rover exploration).

*"FreeWire is a great example of the type of investment we want to make. It's the market leader in mobile fast charging for electric vehicles. It's going to be trialled on our forecourts. We'll learn a lot. FreeWire will learn a lot. BP has the ability to scale FreeWire."*

*"Beyond Limits is genuinely cognitive. It's not just deep learning ... It is looking at mobility with BP and other partners."*

**Meghan Sharp, managing director, BP Ventures – Americas**

# JetBlue Technology Ventures, the magic sauce of industry and investment expertise

*Kaloyan Andonov spoke to Bonny Simi, president of JetBlue Technology Ventures and an active airline captain. Simi talked about the winning team formula of her venturing firm, how people will be flying on electric aircraft by 2025 and about disruptive trends in the travel tech space.*

**You are an active pilot. How does your passion for flying translate into the world of venture investing?**

I would say, there are two things from my previous roles that tie into my venturing role. On the one hand, I am an active airline captain for JetBlue Airways, and actually I flew 200 people from JFK to Charlotte and back over the weekend. Because we have been in the aviation industry for 30 years, we can bring a lot to the table for startups. We understand the viability of a given technology. The other part of my background is that I was the head of talent for JetBlue. That role prepared me the most for my position at JetBlue Technology Ventures. I oversaw all the hiring for the airline for five years. So, one develops a keen eye for talent. When investing in early stage startups, it is more about the "who" than the "what." In other words, understanding the person so we can invest in the person.

In that sense, I would like to stress here that JetBlue Technology Ventures would not be successful without our team. I do want to highlight Raj Singh. He is the managing director who oversees the investment side. While I oversee the entire firm, my focus is mostly on the outside and bringing in deal flow as well as introducing startups to potential investors and






partners as well as ensuring we are supporting the future vision of JetBlue. I think the magic sauce that makes us successful is precisely having one person understanding the industry very deeply and another monitoring the investment side. In cases where you have a CVC led by someone with a VC background only, it can be challenging for that person to understand the corporate side. If it is led by someone only with industry background but no investment experience, it is difficult for that person to truly understand the venturing world. I think the biggest lesson from us as a corporate venturing arm is to make sure you have both – the 'corporate' and the 'venture capital'.

*"I think the biggest lesson from us as a corporate venturing arm is to make sure you have both – the 'corporate' and the 'venture capital'."*

**JetBlue Technology Ventures (JTV) was founded fairly recently, in 2016, and you have started actively building a portfolio. What are the major considerations in your investment thesis?**

We consider investments at the intersection of travel and technology, in a broad sense, extending beyond airlines. We are currently focusing on five "themes." The first are startups improving the customer journey: from the first moment a person thinks about travelling until the moment they come back home and say: "Wow! That was amazing!" Another area of interest is enterprise software that allows us to provide great services, i.e. everything spanning from omni-channel communications through AI-powered assistance to the future-of-work technologies at a large company like JetBlue. Another area we look at is maintenance and operations, which encompasses anything that will help improve or create more efficiencies in our operations, e.g. predictive maintenance and 3D printing, weather or air traffic delay predictions. We also look at revenue management fintech applications as well as loyalty programmes. We also invest in regional transportation technologies, which touches on the question "Will airlines exist in the future?" We believe they will, though likely more for long-haul travel. We believe that the regional transportation sector (1000 miles or less) is ripe for disruption with everything from electric 'jets' to vertical take-off and landing (VTOL) 'flying cars'."


Joby Aviation performed important aerodynamics work with NASA.
http://www.jobyaviation.com/

**What disruptive trends or developments do you see in your areas of interest?**

Currently we are looking at specific technologies that are rapidly disrupting the travel space: artificial intelligence, augmented reality, blockchain, the internet of things (IoT), 3D printing, predictive analytics and electric propulsion. The latter is very interesting. Just as electric propulsion is disrupting automobiles, it is doing the same with VTOL for helicopters and other regional aircraft. You will be flying on electric aircraft by 2025, if not sooner.

*"There is nothing strategic about losing money, so we very carefully screen investments to ensure that there will be some level of return."*

We also see interesting applications of blockchain in distribution. There are many intermediaries in selling airline tickets and hotel bookings, and blockchain could reduce these intermediaries the same way it is now starting to disrupt the "middle man" in banks when it comes to transferring money.

Another disruptive trend is using machine learning to process massive datasets, both on the operational side, such as predictive maintenance, and on the revenue side for dynamic pricing. And then we see augmented reality technologies being used in manufacturing and also for training purposes. While manufacturing does not apply to us directly, we do provide extensive training.

As for 3D printing applications, we are particularly focused on printing of interior aircraft parts. If you think about your tray table or seat – these are easily breakable elements and if we have way to 3D-print them and replace them quickly, it does make a big difference in terms of efficiency.

**Are JTV's investment goals primarily strategic, primarily financial or a mixture of both?**

We are definitely a strategic investor. That said, there is nothing strategic about losing money, so we very carefully screen investments to ensure that there will be some level of return. However, the focus is strategic, as travel is a space that is being rapidly disrupted. We always take minority stakes and provide strategic support to the startups.

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**With the rise of technologies like drones, some believe that we may have flying cars sooner than autonomous cars. What is your stance on the investment potential and opportunities in the urban air mobility space?**

I would say we are very bullish in that space. We do believe that these new vehicles will be piloted much like for cars, where there is autonomy but you still need a driver. We anticipate it will be many, many years before there will be fully autonomous airborne vehicles in passenger service. As for 'flying cars', what prevents them from becoming commonplace right now is that they are not practical, because they are expensive, burn a lot of gas, and are noisy. However, once you switch over to electrical, they can be quiet and very cost efficient. The power density ratio in batteries, within the next year or two, will get to the point allowing to power up a four-to-six-passenger vehicle that can fly for 100-200 miles. So, it is all about the batteries and when the batteries will be ready. And we believe the necessary formula will be there in the next few years.

*"Travel tech is a space that is not readily understood by traditional VCs, so we become someone that can validate the investment."*

**Are you currently investing in any companies developing batteries?**

No, but we are observing this space very closely. We do not do a lot of hardware investments per se but it is a space that we spend a lot of time looking at.

**Let's talk about a recent addition to your portfolio, Skyhour, an online gifting platform for travel.**

Skyhour sits within the fintech and revenue side of our focus. It is actually a common-sense thing. We as a society now value experiences more than material goods. Yet it's still very hard to give an experience, including travel. To give travel to someone today, you have to send a physical gift card, which is transactional, or miles, that can be difficult to use. Skyhour provides a way to give travel without restrictions in the form of skyhours, which can then be applied to any flight and destination desired. Skyhours can be accumulated from many gifters and redeemed whenever the receiver chooses for a destination they've been dreaming of.


Skyhour, an online gifting platform for travel.
https://skyhour.com/

**You are one of the still few women leading a corporate venturing unit. What do you think can be done to motivate more women to work in VC in general and corporate VC investing, in particular?**

I think it is incumbent upon the entire industry to make sure that you have a diverse pool of candidates when a slot is available. I am not saying people should just go out and hire women. You need to hire the best candidate. However, you would be surprised how many amazing women there are out there who do not even get an interview. So, my plea to the industry is: when you have an opening, go out and do the hard work to find at least one female candidate. And then let the slate play out as it is. If the best candidate is a man, then hire the man. You may be surprised how many times the best candidate is a woman!

*Calling All Start-ups: Enter The Future Travel Experience Start-up Competition and Showcase 2018. Are you an entrepreneur with a startup that could revolutionize the travel experience? JTV has partnered with Future Travel Experience to launch three global startup competitions - https://www.fte-hub.com/startup-competition/.*


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DENSO

# Denso International America and the fast-closing window on auto-tech venturing

*Tom Whitehouse spoke to Tony Cannestra, Director of Corporate Ventures at Denso Corporation, a global automotive parts and components manufacturer based in Japan. Tony leads its corporate venture practice out of Denso's office in San Jose, California.*

**Please describe the auto-tech venturing opportunity as you see it today. How have things changed over the last year?**

Right now, it's a gold rush and we're very close to commercialising technologies that will radically advance automotive transportation. For example, all the key technologies that will be needed for level 4 and level 5 autonomy will be created within the next 2-3 years. I'm not saying that the government policies and customer acceptance will necessarily be in place, but the necessary hardware and software technologies will be available and policy-makers will have no "operational integrity" excuses for not allowing autonomous vehicles on the roads. The auto computer vision challenges (LiDAR, advanced Radar, etc.) will also be solved over the next 2-3 years. So, if you're venturing in the automotive and transportation area, now is the time. Quite soon, the opportunities to disrupt at the levels we're currently seeing will go away. There will be very limited opportunities for outsized returns. I think we have a maximum of ten more years of serious innovation in auto-tech before the venturing opportunity becomes seriously limited.

**So, retirement beckons?**

Yes. I'll be moving to England to open a pub. It's always been a dream of mine.

**Seriously?**

No. Typical venture capitalists are like monkeys and they will soon be jumping to other "investment" branches once the autotech opportunity is done. However, corporate venture capitalists don't have that luxury. My group will continue to search for new start-ups working on automotive technology, but we will also probably expand our search to include new areas of business expansion that DENSO will target. Robotics might be a possible area of new investment for us.


ActiveScaler IMBOT features advanced sensors, computer vision, artificial intelligence and analytics to unify and redefine mobility applications.
www.activescaler.com

**Good. We have plenty of pubs in England, not enough corporate venture capitalists. Can you expand on the notion that autotech investing will become "seriously limited"? GCV data shows investment rising year-on-year in auto-tech and related sectors. Are you predicting a peak?**

I believe that we are approaching the peak. In fact, it's already getting very hard to fund a start-up in some automotive sub-sectors. For example, at last count, I have identified about forty-two LiDAR start-ups, eight of which are very well funded. Probably only three or four are going to survive the next 5 years, leaving a lot of failed businesses and unhappy investors. This means that we're not going to see another wave of LiDAR companies getting funded. There will just be too many investors who got burned.

**So that window has in fact already closed.**

I believe so. It will be the successful start-ups that will do the R&D for the next iterations of LiDAR. It won't be new venture-backed start-ups because those start-ups won't get the venture backing.

**Where are the windows still open? What are you looking for that you don't currently have?**

*"I'm certainly interested in start-ups that are addressing the problem of getting us to adopt and use new cars' safety capabilities."*

I am increasingly interested in how to combine the personalisation of transport with its increasing autonomy and automation. The car is going to remain, for a lot of people, a personal domain, an extension of yourself. Generally, most consumers are okay with non-intrusive automation, like ABS braking systems and intermittent windshield wipers for example, because the driver remains in control. But some of the autonomous and automatic features that are now being introduced are intrusive. Studies have shown that people don't like those systems, and often turn them off. They don't want to fight with their car about taking some sort of action, like changing lanes. If I, as the owner/driver of the car thinks it is safe to change lanes, but the system in the car does not think it is safe, that becomes a problem. And the auto industry needs to address this situation because we don't want the consumers turning off systems that are meant to help them drive more safely. Also, the lingering





effect on the consumers is that they then don't like those new "autonomous" systems. The car needs to be able to understand the driving "personality" of each driver, and then adjust its systems to fit that driver. So, I'm certainly interested in start-ups that are addressing the problem of getting us to adopt and use new cars' safety capabilities, for example, while still giving us the feeling of control over our own domain.

*"Start-ups that have alternative monitoring systems that don't point a camera at your face and that can make the data anonymous, or … prevent the release of private data would be of interest to me."*

**Can you give examples of where this fight is being avoided, where drivers still feel in control of their domain?**

A great example is the birds eye camera system that Nissan has pioneered to give the driver a view of the car from above to help with parking, particularly with parallel parking on streets. This is being embraced and loved. For a lot of us, it's been the end of cursing in the car while trying to park in a tight space.

**So, you want more such innovations that free the driver without withdrawing his or her sense of control?**

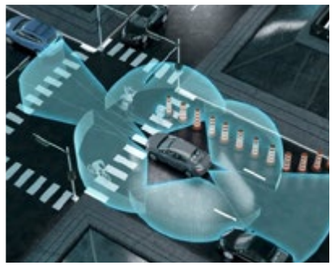
Yes! A lot of start-ups tend to think of personalisation inside the cabin – the radio stations, the seating position. But they now need to move to the car itself and how it responds to the driver, especially up to level 4 autonomy. With level 5, it won't matter, but at level 4, we need to overcome increasingly negative attitudes to autonomy from drivers. For example, few of us like having a camera pointed at us, which seems to be the current solution for driver status monitoring systems, and many of us are worried about data security. So, start-ups that have alternative monitoring systems that don't point a camera at your face and that can make the data anonymous, or that can prevent the release of private data would be of interest to me.

**What else is of interest?**

How to make a car see - computer vision. This excites a lot of VCs. By synthesizing hearing, sight and mental intuition, humans become good drivers. Cars need to do this through sensor fusion, they need to fuse all the

TRILUMINA

TriLumina Corp. solid-state, back-emitting, low-cost VCSEL illumination modules for LiDAR and 3D sensing.
http://www.trilumina.com/



information they're getting from different sensors, understand it and make immediate decisions. And behind this problem is the "compute" problem. Basically, each car would need a super computer in order to achieve Level 4 autonomous driving. But you can't stick a mainframe on the top of the car and no one wants one in their trunk. Don't forget that silicon chip investing dried up several years ago. We're going to have to find new ways to deliver the compute functionality that next generation vehicles are going to need.

**How are your portfolio companies approaching these problems?**

I can give you two good examples. ThinCI is a California-based company we invested in two years ago that is developing a unique computer chip architecture. It's able to put deep learning algorithms on the chip itself. We're confident we'll get somewhere around 5-10 times the compute performance offered by the next best solution. Trilumina is an Albuquerque-based company we invested in back in 2016. We believe that the company's VCSEL technology is going to be a fundamental illumination technology for both driver status monitoring systems and some LiDAR solutions.


THINCI deep learning and vision processing technology.
https://thinci.com/

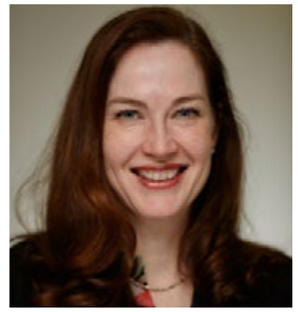
**What's the strategic angle here for Denso?**

The technology being commercialised by our portfolio companies is what our customers – the automotive OEMs – will need in the near future. Our strategic benefit is being able to balance internal development efforts against external development efforts; it is a type of buy versus build comparison. For example, ThinCI provides a step change in processing capability that will enable computer vision and complex decision matrices while also reducing power requirements. It would be difficult, if not impossible, for DENSO to internally develop that same sort of technology. Trilumina provides unique VCSEL technology for illumination applications, but at an affordable price. This is the reason why we venture; we want to enable continued success in our core business of supplying auto parts and we can't always rely on our internal R&D to provide those types of new technology.





# Fast-charged and increasingly mobile, BP Ventures' Meghan Sharp gets personal about transport



In the interview below, Meghan Sharp, the San Francisco-based managing director of BP Ventures, explains to Tom Whitehouse some of the ways in which BP is using venturing to participate in the disruption of travel and find new business models which draw on and build on BP strengths.

**Meghan, what do you drive?**

I rarely drive. I use Uber or Lyft. And it's changed my life, professionally and personally. My working days starts on the phone in an Uber. At BP we have a strict policy that you can't be on the phone while driving. But there's no way I'm going to spend an hour driving to work in the morning. I need to catch up with Europe and the East Coast, which means I'm on the phone. So, I get an Uber every day. (And by the way, this is at my own expense). On the personal side, we've been able to use curb-side check in at the airport, and Uber and competing services to very conveniently, safely and inexpensively transport my mother to come and see us in San Francisco. She lives in a different city and there's no way this would be possible without the innovation in travel we've seen in recent years.

**So, there's a personal as well as a professional commitment to venturing in new mobility technologies?**

Yes. I've embraced the new model of transport. Or maybe it's embraced me. Sometimes there is wifi in the cars I'm in. This is going to become increasingly the norm – the car is going to be very similar to the office environment in terms of the amenities it offers. This means that the car is going to be competing more with the plane, and many of us will choose to

be driven rather than to fly. For example, to get to LA from San Francisco is an 8-hour drive. Sure, it's longer than a two-hour flight, but if you factor in the ride to and from the airport, the security clearance and the hassle, the 8-hour car journey is increasingly attractive, particularly as we switch to autonomous vehicles, which will increase safety.

**Where and when do electric vehicles feature in this picture? Most of the cars you get in today are still powered by the internal combustion engine.**

*"I don't think there's a bubble. These are real trends that are underpinned by societal demand."*

Yes, they are. But I was picked up by a Tesla last week and I expect to be sitting in more EVs in the very near future.

**Don't you worry that there is a lot of hype around EVs and AVs? Is there a danger we're in a bubble?**

I don't think there's a bubble. These are real trends that are underpinned by societal demand. BP is an oil and gas major. The internal combustion engine is a big part of its history and we believe it will still be a big part of its future. However, our perspective is that the EV market is real and emerging, and we want to create a disruptive, distinctive and differentiated offer looking at supporting that market.

**How? What are you prioritising? What type of venture investments are you looking for?**

Over the next 12 months a big focus for us will be on what we do with BP's forecourts. BP has all this real estate and all these gas stations. How is it going to monetise that? What are the gas stations going to be in the future? BP isn't betting that they are going to remain just gas stations. They are going to introduce more electric vehicle charging facilities at them. That's why we're really interested in fast charging and other technologies. We are also very focused on the material technology that enables this.


FreeWire Technologies - https://freewiretech.com



**Let's hear about your most recent investment in charging technology, FreeWire Technologies.**

FreeWire is a great example of the type of investment we want to make. It's the market leader in mobile fast charging for electric vehicles. It's going to be trialled on our forecourts. We'll learn a lot. FreeWire will learn a lot. BP has the ability to scale FreeWire. It should be a mutually beneficial relationship. If all we can offer a venture investment is dollars, it's not the right relationship for both parties. The strategic relationship has to go both ways.

*"The EV market is real and emerging, and we want to create a disruptive, distinctive and differentiated offer looking at supporting that market."*

**Why should the EV owner charge his vehicle at a BP gas station? What can BP provide that you can't get elsewhere?**

It turns out that lots of people don't have garages they can charge their vehicles in. Around 50% of people simply can't charge at home. Charging on a BP forecourt will be a winning proposition if you can charge in about ten minutes and drive for about 300 miles. If you re-charge at home, you don't care how long it takes to re-charge. But with recharging elsewhere, speed is a big issue. So, we're very interested in fast-charging deals.

**Turning now to autonomy, what's your most recent investment here?**

We were the sole investor in Beyond Limits, a cognitive AI business whose team came out of Jet Propulsion Labs [part of NASA]. To date, most of the work we've done with Beyond Limits is to find what relief they can provide to our pain points in the upstream, but we know there will be applications also for the downstream. Beyond Limits is looking at mobility with BP and other partners. We will get proof of concept on its applications before going into deployment.


Beyond Limits - born in NASA's Caltech labs.
www.beyond.ai


bp ventures DENSO jetBlue technology ventures Global Corporate Venturing Leadership Society leif

It's really exciting. We know that Beyond Limits is genuinely cognitive. It's not just deep learning. With AV, there's a huge safety issue. We have to get it right and AI is going to play a huge piece.

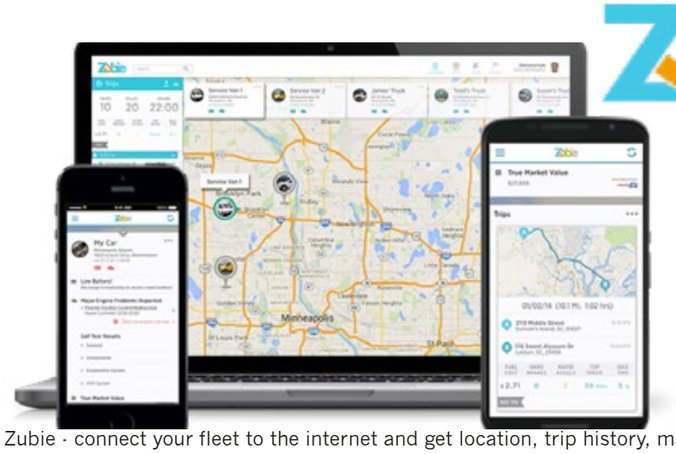
**With EV and AV, how big a pond are you fishing in? What types of deals are you after? How early stage do you go?**

*"Our next US venture investments are likely to be in fast charging and we are very focused on the material technology that enables fast charging."*

We're happy to do all stages including very early. BP is making a lot more capital available for advanced mobility opportunities and other core focus areas so we are not constrained. We recently funded and sponsored a smart mobility competition for entrepreneurs at the NYU Tandon School of Engineering as well as partnering with TechX, an oil and gas incubator in the UK. But we're also interested in technologies that are closer to commercialisation as well as in growth capital opportunities.

**Other than fast charging, what else are you prioritising in mobility?**

We're taking a very close look across the value chains and how it all fits together. We're keen to see venture opportunities that disrupt the value chain at any point. We are continuing to explore opportunities in smart and advanced mobility. As BP's recent Energy Outlook found, the interaction of fully-autonomous cars with shared mobility has the potential to substantially boost the intensity with which electric cars are driven. BP has a new business unit, the Advanced Mobility Unit, which is focused on exploring various mobility options, and which will help inform our venturing. This is mission critical work, which can have a huge impact on not only BP's overall business, but wider society as well.

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jetBlue technology ventures

# Will blockchain revolutionize the travel industry?

Alex Kaufman, Investor, JetBlue Ventures

The hype for cryptocurrency has reached a fever pitch. While investors try to guess the rise and fall of bitcoin, we believe the underlying blockchain technology is far more important and will be more impactful worldwide, across all industries, than cryptocurrency alone. Let's take a look at the areas where Blockchain could transform travel:

**1. Security**

As identity thieves and database hackers prey on a rapidly digitizing world, now, more than ever, it's critical to ensure that identity verification in travel transactions is efficient, accurate and secure. Blockchain could offer a solution by securely storing sensitive information, such as biometric data. This could have huge implications for managing identity, including confirming ID's at national borders. On the world stage today, the undisputed leader in blockchain-powered identity solutions is the country of Estonia, which already provides its citizens with digital IDs to access government services and travel within the EU.

Blockchain could make it easier for consumers to securely share information with travel businesses, too. We interviewed Trond Vidar Bjorøy, head of product development and implementation at ATPI Group, a global travel management provider, and he explains: "With blockchain, you could have one ID for airlines or your travel management company, with all your travel preferences, payment methods and contact details. The key is, you decide who can access your identity and personal information, and you can cut someone off if you no longer want them to have access to it."


## 2. Loyalty Programs

According to a recent report by Deloitte, one-fifth of loyalty program members never redeem their rewards. This isn't just bad for consumers, it also impacts the loyalty providers. Unclaimed rewards count as liabilities on companies' balance sheets, and program members who don't redeem rewards are 2.7 times more likely to leave the program and join a different one.

Through blockchain, travel businesses can empower customers to make the most out of their points and miles, while reducing their own liabilities. Just as blockchain-powered solutions help financial transactions happen instantly, they can speed up rewards redemptions too. Moreover, when companies cooperate to join a single blockchain network, cross-redemptions—spending rewards from one brand's loyalty program on products from a different brand—could become faster and easier.

Partners at the consulting firm Oliver Wyman, writing in Harvard Business Review, predict that between four to six blockchain-based loyalty networks will ultimately dominate the travel space. Loyyal is one example of a company attempting to build a blockchain-based multi-party loyalty platform.

## 3. Smart Contracts

Smart contracts could add yet another layer of efficiency to the way we travel. Smart contracts, which are stored on the blockchain and can be automatically executed once certain conditions are verified, could help devices and machines transact automatically with one another, potentially leading to far greater automation on the airfield and elsewhere. One company leading in this space is Filament, a JetBlue Technology Ventures portfolio company, which recently debuted a new chip that will allow connected industrial devices, shipping containers, and similar assets to securely interact with and transact against blockchains. We can imagine things like instant payment for service providers, leading to higher contract compliance and reduction of back office transactions.



## 4. Cross-Border Transactions

Global travel often includes a host of cross-border transactions, which are typically more expensive, complicated, and time-consuming than domestic transactions. Prominent startups that aim to improve cross-border transactions, via reducing intermediaries, are Stellar and Ripple. Stellar recently gained the support of Stripe, a company that handles digital transactions for more than 100,000 businesses in 25 countries. Ripple's enterprise blockchain network, RippleNet, now counts more than 100 financial institutions as members, including, most recently, American Express and Santander.

*"...cross-border transactions will also benefit from cryptocurrencies, travelers and businesses avoid the fees and risks associated with exchanging currency."*

Of course, the cross-border transactions will also benefit from cryptocurrencies, travelers and businesses avoid the fees and risks associated with exchanging currency. These transfers happen securely without an intermediary and can be completed in seconds. A select few prominent travel companies now accept Bitcoin, including Expedia. Meanwhile, three Caribbean tourist hotspots are working on their own digital currencies.

## 5. Distribution

Much like cross-border transactions, business-to-business travel transactions are handled through intermediaries. When travel suppliers do business with travel agents and online travel agencies, they go through what are known as global distribution systems ("GDS"). These systems charge fees for access and services, which may prove prohibitive for travel startups, and add cost to the overall travel ecosystem for existing travel providers, which in turn increases costs for travelers. While current distribution systems provide value to both travel providers and travelers, blockchain could disrupt this entire space.

*"Through blockchain, it's possible to create a digital marketplace that allows direct B2B transactions between travel businesses, reducing costs and improving efficiency."*

Through blockchain, it's possible to create a digital marketplace that allows direct B2B transactions between travel businesses, reducing costs and improving efficiency. Such a marketplace could eventually be open to consumers as well, potentially allowing travelers to bypass agents. There is early experimentation in this space, with startups like Winding Tree, which is creating a business-to-business blockchain-based platform for air travel, and Lockchain that is developing a blockchain based hotel distribution platform. Established companies like European tour operator TUI, have created internal blockchain platforms to track hotel inventory.

**The Hurdles and the Future**

The best blockchain-based startups are still fighting for dominance, much as web companies did during the '90s dot-com boom. It will take a few years for the new business models to emerge, but we believe now is the time to begin learning about and experimenting in this space.

Ultimately, scale will prove critical in determining the success of these solutions. With scale, blockchain networks can realize their true disruptive potential.

It's unclear, however, how well businesses and other entities, such as governments and industry associations, will cooperate to form, as Craig Gottlieb, principal director of aerospace and defense at Accenture called it during our interview with him, a "coalition of the willing" to support blockchain networks.

For now, plenty of "willing" parties in the travel industry are eager to at least experiment with blockchain. Given all of the innovative blockchain-powered solutions in the works today, we're confident that blockchain will one day make the travel industry more seamless, secure and efficient.

*"Ultimately, scale will prove critical in determining the success of these solutions. With scale, blockchain networks can realize their true disruptive potential."*





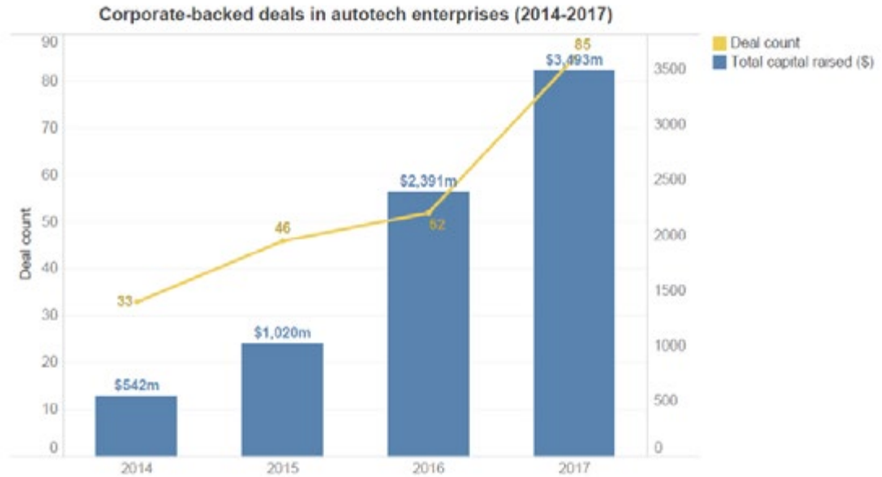
# Corporate venturing

## 2014 - 2017 review

## Kaloyan Andonov, reporter, GCV

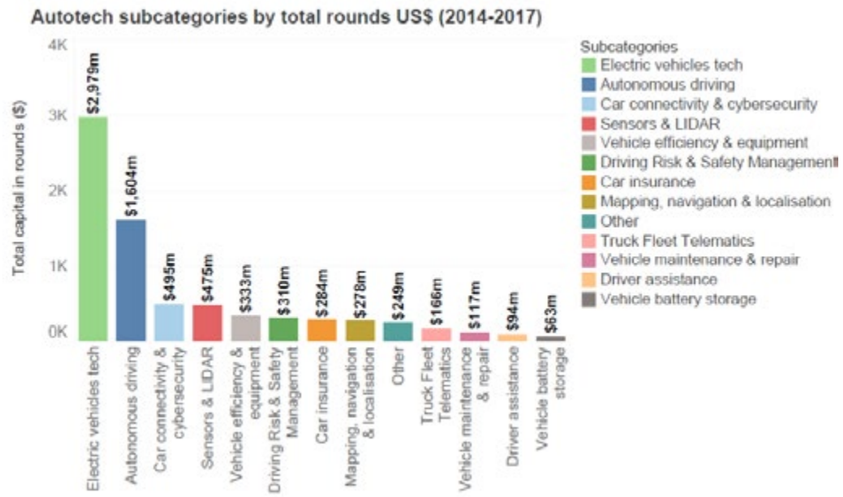
Autotech, as defined by GCV Analytics, comprises a broad spectrum of technologies related to connected, autonomous and electric vehicles. Autotech has been one of the fastest growing new technologies over the past few years, having drawn a host of corporate investors from across different sectors and around the globe. In 2014, GCV Analytics tracked 33 rounds in such enterprises, worth an estimated total of $542m. These figures went up considerably by the end of 2017, when 85 corporate-backed deals were recorded, totalling $3.49bn. There is clear upward trend that has been getting steeper and, for the moment, is very likely to remain so in the near future.

Graph 7

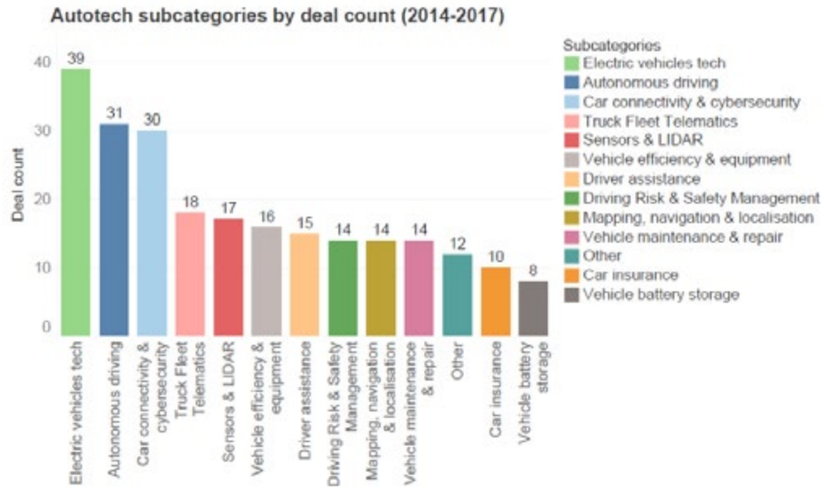



The top sub-categories of emerging autotech companies that have raised the largest number of corporate-backed rounds over the past four years are electric vehicles tech (36), autonomous driving tech (31), car connectivity and cybersecurity (30) as well as truck fleet telematics (18). Autonomous driving and electric vehicles tech have been undisputed champions in raising the bulkiest corporate-backed rounds, which is indicative of the extent to which autonomous and electric vehicles are to reshape transport as we know it.

Graph 8




Graph 9

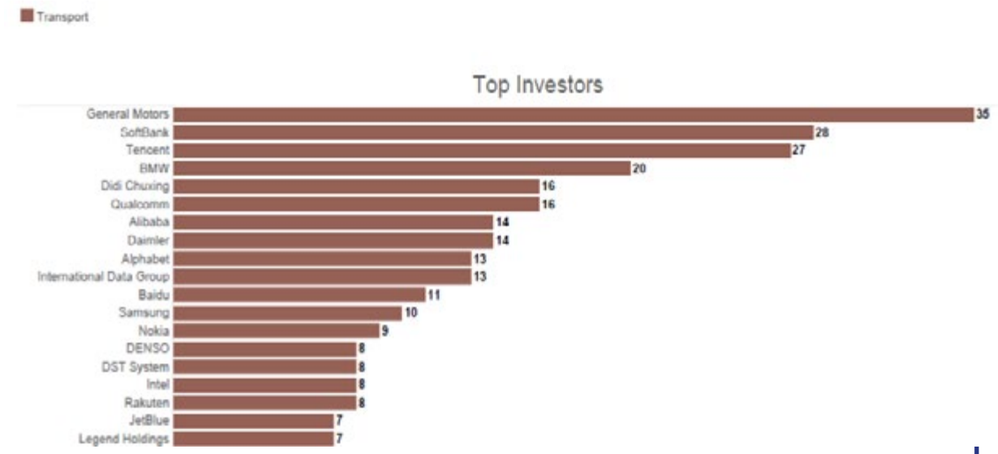



Innovations in the broader transport sector (including autotech, ride hailing and car sharing, car marketplaces, logistics services and other transport) have attracted the interest of corporates across sectors and not merely traditional automotive corporate venturers. While General Motors (GM) led in number of deals over the past four years, it was followed by telecoms company SoftBank and internet company Tencent.



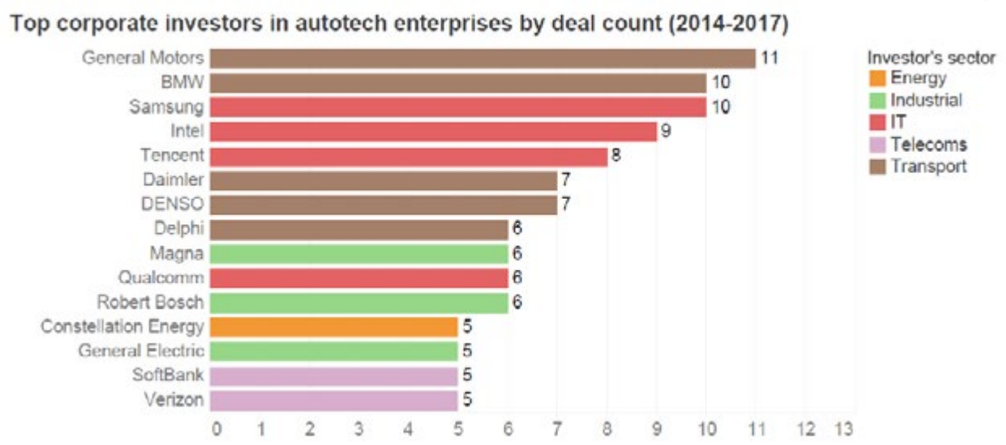


Graph 10




The top corporate investors in the more narrowly-defined autotech space have been the venturing arms of transport companies and car manufacturers like GM and BMW but we also find others on the top of the list, like electronics producers Samsung, chip and semiconductor manufactures Intel and Qualcomm as well as Tencent. This diversity of corporate investors interested in the space indicates how profound the potential disruption impact of these technologies is expected to be and how it is going to affect incumbent businesses in multiple sectors.

Graph 11

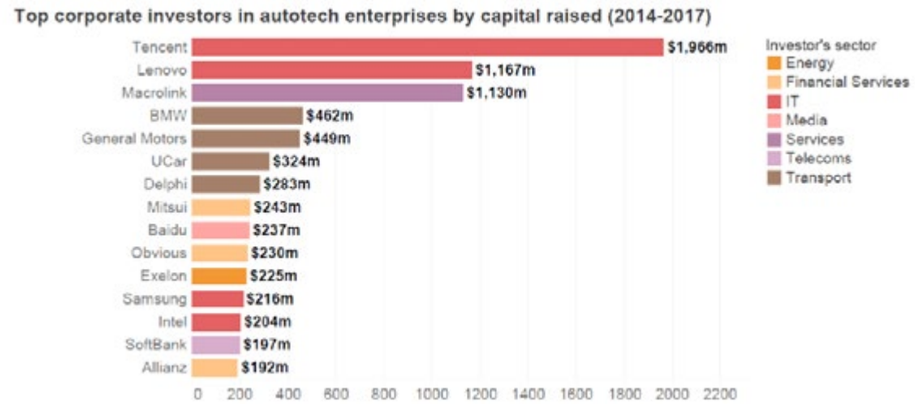


China-based corporate venturers have demonstrated considerable interest in the autotech space, as the historical bar chart suggests. The appended table below also offer a summary of autotech enterprises in the portfolios of the most active China-based corporate investors in this space.
The top deals in the autotech realm have been multimillion rounds, above the $100m mark, and the largest ones were raised by three China-based autonomous and electric vehicle developers – Le Supercar, Nio and Xiaopeng Motors.

Launched in 2014, Le Supercar boasts a team of more than 1,000 people working together to develop an autonomous car provisionally dubbed LeSee.

China-based electric car developer Nio, formerly known as NextEV, is working on smart electric vehicles (EVs) and in November 2016 completed its first model, a supercar that it claims is the world's fastest EV.
Founded in 2014, Xiaopeng is working on an all-electric sports utility vehicle called Xpeng that will be capable of being mass produced relatively quickly.

Graph 12






## Coming up in the June edition

### 'Corporate Venturing and the Future of Mobility, Automotive and Travel'

*Q1 2018 global CVC deal review*

*What was learned at the GCV London Symposium*

*Sponsor interviews / profiles, guest commentary*

*A look ahead to the GCV Asia Congress*

## Focus on China

- *Top investors, hottest sub-sectors, top Chinese investors in non-Chinese technology businesses, top non-Chinese investors in Chinese technology businesses*
- *Case studies in Chinese CVC-backed mobility, auto and travel tech*
- *Does China have an unassailable lead in EV battery technology?*



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