Autonomous vehicles & auto-tours

What is an auto-tour and how will autonomous vehicles impact tours, attractions & cities?

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Google prototype autonomous car
Flickr: Marc van der Chijs

DestinationCTO

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This report is educated guesswork as to how the auto-tour industry may be built and the subsequent impacts.

It outlines early thinking on a topic that has had no public discourse. Thoughts, strategies and implications are liable to change over the coming years.

In 2018 it is not possible to predict with complete accuracy what the future may look like in ten years time or when within that timeline significant change will occur. The concepts as outlined in this document may be delivered in a different sequence, or not at all. The timing could be twenty years not ten.

Use this information as you see fit. You have been warned!

Thank you

Thank you to Stuart Carter, Alex Kremer, and Kevin O’Shaughnessy for reviewing early drafts of this report.

1. Executive summary

In 2018 most major car manufacturing companies have autonomous car hardware programmes. Opinions vary as to when these research projects may deliver fully autonomous cars on public roads.

Expert consensus is that autonomous cars will be in general regular usage by 2027 with specific use cases live before then.

Much of the public focus on this new technology has been on autonomous cars replacing the transit tasks undertaken by personally owned and driven cars, human driven taxis and airport shuttles.

We believe these autonomous vehicles will be used by tourism businesses to create a new class of sightseeing tour, an auto-tour.

This could make transport based city tours (such as “hop on hop off” bus tours) and *some* guided tours (currently by foot) obsolete.

Autonomous vehicles will also impact rural multi-day tours (where you travel from place to place staying in a different hotel each night).

This report addresses these and other tourism impacts and outlines a potential scene for the future.

Flying vehicles are out of scope for this report. (Although Uber is working on city based flying vehicles, see Uber Elevate - www.uber.com/elevate)

Street scenes will change significantly with the introduction of autonomous vehicles
Flickr: Jeff Turner

2. Terminology - an auto-tour

2.1. “Self-drive" vs “self-driving” is confusing

Within the travel industry there is a well used term - a self-drive car tour, where you hire a car or motor-home and go on an extended tour of a region, on a route documented by the self-drive tour operator. The *self* is because *you* drive the vehicle, not a professional driver or tour guide.

Because of this we cannot refer to tours in cars that drive themselves as *self-driving* tours. We need a new name for clarity.

2.2. Etymology for auto-tour

The new generic term for a sightseeing tour in a self-driving or autonomous vehicle should, we suggest, be **auto-tour.**

The word auto-tour has two parts:

> **Auto** - *auto* means *self* in ancient Greek, representing auto in autonomous or automobile
> **Tour** - reinforces this is a leisure experience; this is not a transit solution

For clarity, newly formed words should have hyphens - hence auto-tour.

2.3. Other terminology considerations

Incase you want to debate why we chose auto-tour ;)

Is it a car?

All cars are automobiles but not all automobiles are cars.

It is not yet clear that what we currently refer to as an autonomous car is actually a car (but it is certainly an automobile). Hence we avoided using the car word altogether.

We use the car word in this report as that is the word used today, at least while tour vehicles are remain ground-based (i.e. not flying).

Larger capacity autonomous vehicles are already being tested on the roads - e.g. autonomous minibuses - another reason to avoid using the “car” word.

Autonomous may not continue to be necessary as an adjective

A telephone is now referred to as a phone - not a telephone, mobile phone or smart phone.

Similarly, when *all* cars self-drive, self-driving or autonomous cars will be referred to as cars (if they are still cars).

By that point there will both be car and non-car based tours and activities, so a distinction will need to be made between them, even if the “autonomous" adjective is dropped.

Future proofing

The term auto-tour seems future-proofed as it can be applied to both flying vehicle tours and ground-based tours.

3. Top-level concept

3.1. End-to-end passenger experience

It's 11:30 and Alex checks out of his hotel. He doesn't need to be at the airport until 12:30 for his flight at 14:00.

He hails an autonomous car using his phone (or other wearable device) and one arrives almost immediately.

Alex's phone tells the car AI (artificial intelligence) that he needs to be at the airport at 12:30.

The car AI, Parker*, asks:

> **Parker**: A 60-minute tour ending at the airport sir?
>
> **Alex**: Yes

Parker creates two options…… a food tour (knowing that Alex hasn't had breakfast, his phone tracks Alex's blood sugar levels) and a sightseeing tour.

> **Parker**: Please select an option
>
> **Alex**: Sightseeing

Parker takes Alex to a city viewpoint, knowing (again from Alex's phone) that he hasn't seen this view before.

Alex jumps out and admires the view and his phone records that he has seen it. On future trips this will only be suggested again if Alex gives a positive review this time.

> **Alex**: I changed my mind, I would like some breakfast
>
> **Parker**: Yes, sir!

Parker knows that Alex isn't a vegan thanks to his social media food profile.

> **Parker**: Perhaps an egg breakfast sandwich, sir?
>
> **Alex**: Sounds perfect, Parker

Parker instantly recalculates a new itinerary for Alex taking into account the current and upcoming traffic on the route to the airport and the best place for a memorable egg breakfast sandwich.

Parker takes Alex to a quick service restaurant. The order is waiting when they arrive (booked ahead automatically by Parker).

> **Parker**: Did you enjoy the egg breakfast sandwich?
>
> **Alex**: Yes thank you Parker!

Parker drives to the airport arriving at 12:30 precisely and Alex successfully catches his flight with no dead time waiting at the airport. Success!

** Parker be voice interface or some other form of conversational user interface*

3.2. Defining characteristics

There are ten defining characteristics of auto-tours:

1 - Proximity is no longer the main factor in city tour itinerary design

City tours currently tend to go from A to B to C in a natural order based on proximity (because people are walking). With auto-tours you can go from C to A to B or any order you like.

2 - Itineraries will be tech-driven and algorithmically generated

Auto-tour itineraries can be algorithmically generated, not pre-set by humans as current city tours are.

For example if affinity analysis suggests 75% of people who enjoy place A also enjoy place B, an algorithm can put both in the same itinerary.

As itineraries are technology generated they are instantly reconfigurable. If you visit place A then actually then want to go to place C, missing place B, you can and the itinerary will re-configure.

3 - Personalisation

Personalisation will adjust:

- whether a place appears in the itinerary
- the order in which places are visited
- the length of time spent in a place
- content delivery style - e.g. children vs teenagers vs adults, or to match cultural expectations
- language - it makes no difference where the tourist is from, an auto-tour can be given in any language

Personalisation can happen in real time. If place A and place B share a very similar profile then any passengers who didn't enjoy place A can be routed straight to place C.

Personalisation can also take group preferences into account, e.g if there is more than one person in the car, the personalisation needs to be collective, taking everyone in the car into account.

If there are children in the car, the itinerary could be personalised for their age or what they are learning at school.

4 - Long tail tours and multiple topics in a single tour

Local tours are currently locked into fixed itineraries that are created beforehand. They are designed to be commercially viable, i.e attractive to many different people. Independent tour guides tend to focus on one area for example food, music, shopping or perhaps history so although are more flexible than local tours, they are not completely flexible.

Algorithmically generated auto-tour itineraries can offer an infinite variety of long tail tours, so that if only five people want that specific tour each year, auto-tours can deliver that specific itinerary.

For example an Elvis themed tour in London would be possible. Or a specific sports team tour. You could even request a tour that was 75% Elvis and 25% a specific sports team. Now that is niche!

5 - Place to place, not car park to car park

By necessity current tours by bus or car tend to take you from car park to car park. Auto-tours will be able to go door to door, dropping you outside your destination, parking themselves elsewhere and picking you up from the same place whenever you're ready.

This will be very important for attractions. Visitors will want to be set down at the entrance area, not in the car park.

6 - Tours can start and end anywhere

Auto-tours will be super flexible: able to pick passengers up anywhere, take them to where they want to go and drop them off wherever they want to finish (not necessarily where they started).

Transit routes could become tours…. Why not make your your daily commute a different educational auto-tour each day?

7 - Tours can start and end anytime

It's 02:00 your flight has just landed and your body hasn't adjusted to the new timezone. No problem! Go for a nightlife tour or just ask the car to take you to a restaurant that is still open.

8 - Tours can be any duration

Want a 30-minute tour? You can have one.
Want a 12-hour tour? Auto-tours won't get tired.

9 - Reliable timings

Want a 30-minute tour? It will be 30 minutes.
Want a 12-hour tour? It will be 12 hours.

The car AI will know the current and predicted traffic, so it can plan accordingly.

10 - Multi-transport choices

You don't have to do a complete auto-tour in the same car or do it only by car.

Why not spend 30 minutes in the car, 20 minutes on a bicycle, 30 minutes on a Segway and then rejoin the original (or replacement) car? Auto-tours can handle these changes.

4. Impact by market sector

4.1. Day tours & activities

The battle for customer attention

Auto-tours are a new class of tour, not a new technology to deliver existing tours.

They are not a like for like replacement, but will compete for the same customer attention. Whether an auto-tour or a human delivered tour wins will come to down to the customer experience and price.

Customer experience
*T*he complete removal of any kind of friction in booking and joining an auto-tour is likely to make them a simple and attractive choice. Compared to instantly created or a selectable long tail tour itineraries (e.g. an Elvis themed tour of London), existing tour itineraries will seem boring and mainstream.

Although fewer people will take the long tail auto-tours (counted by single itinerary rather than collectively), these customers will LOVE these tours due to matching their exact interests. Compare this to tourists who enjoy but perhaps don't love their mainstream city tours, due to their mass-interest design.

Auto-tours will improve the more times you take one as the system's knowledge about you improves. If you take a tour in New York and really like a certain place, this information will feed into the new itinerary proposal next time you take an auto-tour, even if in a different city. Your customer experience will only improve over time.

There is also a customer experience network effect - the more people take an auto-tour, the better the tour will become, as enjoyment feedback is automatically incorporated.

Price
Auto-tours are likely to be possible to price competitively against human provided tours, even though the hardware and technology will be expensive initially. (This price comparison is a big unknown, however, but we expect autonomous taxis will be ubiquitous commodity services and basic auto-tours have no significant marginal cost over those services, if using the same vehicles).

Auto-tour vehicles will be able to operate continuously to meet demand (apart from maintenance / battery charging / cleaning periods).

Impact will differ between tours & activities

One difference between tour and activities is whether a tour or activity of several hours duration is a single experience or multiple experiences fused together and sold as a single unit.

For example, a four hour white water rafting activity will probably involve only white water rafting, whereas a four hour city centre tour will take in many different sights, sounds and smells within those same four hours. Tours don't stay in one place and do one thing.

Such multi-element tours can be broken down into their component parts, and the auto-tour personalisation system can rebuild those parts into new combined tours; in fact, they can create infinite numbers of new combined tours once personalisation and other algorithmically made decisions are applied.

Multi-element city tours are going to be impacted significantly by auto-tours. Most activities have already broken down into their smallest elements and will be incorporated into auto-tours rather than replaced by them.

Hotel pickups

Many current tours incorporate a hotel pickup service, generally in one of two styles:

- pickup from hotel on the way to the tour - so anyone who is on the same tour - the same vehicle pickups up everyone on that tour. Ideal for situations where few people are on the same tour or hotels are close together.
- pickup from hotel, take customers to a central place, reuse the same vehicles/drivers to provide the tours themselves.

This is a positive service for the customer, but a lot of friction. The customer has to either sit in a vehicle and pickup other customers - or be transported to the central place, checkin, wait, and then do their tour.

Personalising all auto-tours means they can all include hotel pickup as standard.

Auto-tours will start the moment the customer walks outside, not at a time and place prescribed by the tour operator. This approach is so much nicer for a customer on holiday to be able to decide, oh, not going to be outside at 08:30, will be there 09:00, my auto-tour can start then. Less stress, more happiness.

Autonomous vehicles may also be used as a third approach to address the existing logistical challenge, for current tour styles. This is a transit use case for autonomous vehicles, not an auto-tour use case.

Positive impacts for human delivered tours

Road safety and the desire to travel differently
Safer roads and cities could mean non-automobile transport tours become more attractive to tourists e.g. cycle tours, Segway tours, walking tours etc.

If you use an autonomous vehicle every day will you want to use autonomous vehicles when on holiday?

Driving experiences
Driving becomes recreation not transport in the same way that horse riding evolved from transport to a leisure activity. The generation who have driven cars themselves (which we estimate will be anyone born before 2010) may want to recreate this memory.

This will create opportunities for:

- race track drive days
- go karting
- off road jeep tours
- or perhaps just drive regular cars from your youth!

Many existing in-destination experiences are based on the tourist driving a vehicle themselves. This will continue, except within cities.

Evening experiences

If you're confident you can get back to your hotel, you may stay out later and be more adventurous. It's impossible to be "drunk under the influence" in an autonomous vehicle (although laws are yet to change on this specific point).

Sellers of evening tours could see a real increase in business.

4.2. Independent tour guides and hosts

Tour guides are passionate individuals who are amazing at explaining the history of a place, and tourists value the experience of learning from guides as much as the information itself.

Tour guides are unlikely to become obsolete, at least, not because of autonomous vehicles or auto-tour technology.

Independent tour guides could compete with local tour businesses

Independent tour guides tend not to provide vehicle-based tours as they have no vehicles to use, apart from public transport. (If they do have insured and suitable vehicles, they would be classified as a vehicle based tour operator businesses, not independent tour guides).

Using autonomous vehicles, independent tour guides will be able to cover much wider areas than they currently do - a positive benefit for these guides.

Why would they not do this already using taxis? Hiring an autonomous vehicle will be less expensive than a current human-driven taxi. (See pricing notes in section 4.1)

Place hosts

Will auto-tour customers wants the same tour guide (if required) to stay with them for the full duration of their auto-tour? Or will they prefer a guide assigned on a place by place basis?

Both options will probably be available, but the place host will be the more affordable option.

Place host may well work for the place itself; or for the auto-tour business. Or perhaps an independent newly-formed place host marketplace, reselling appropriate individuals to auto-tour operators, in real-time.

Long tail specialisation

How will tour guide knowledge requirements be affected if auto-tour customers are able to create or choose itineraries from a much more diverse selection?

Will tour guides need to be multi-specialist, but with each speciality having limited consumer demand, trying to replicate what auto-tours can deliver? Or will they become generalists?

Perhaps they will focus on source markets instead, so one guide works with Chinese customers; and another with USA customers.

Dinners with locals

Dining experiences in a local person's home, eating their style of food, are rising in popularity.

They tend to be available in the suburbs of cities, not centrally located like restaurants, because that is where younger meal hosts tend to live.

Autonomous vehicles will make it possible for tourists to explore the suburbs in the evening by removing any concerns about getting back to their hotel.

4.3. Ticketed attractions

Attractions will be seamlessly incorporated into auto-tours. e.g. a four hour auto-tour could include an hour at a theme park.

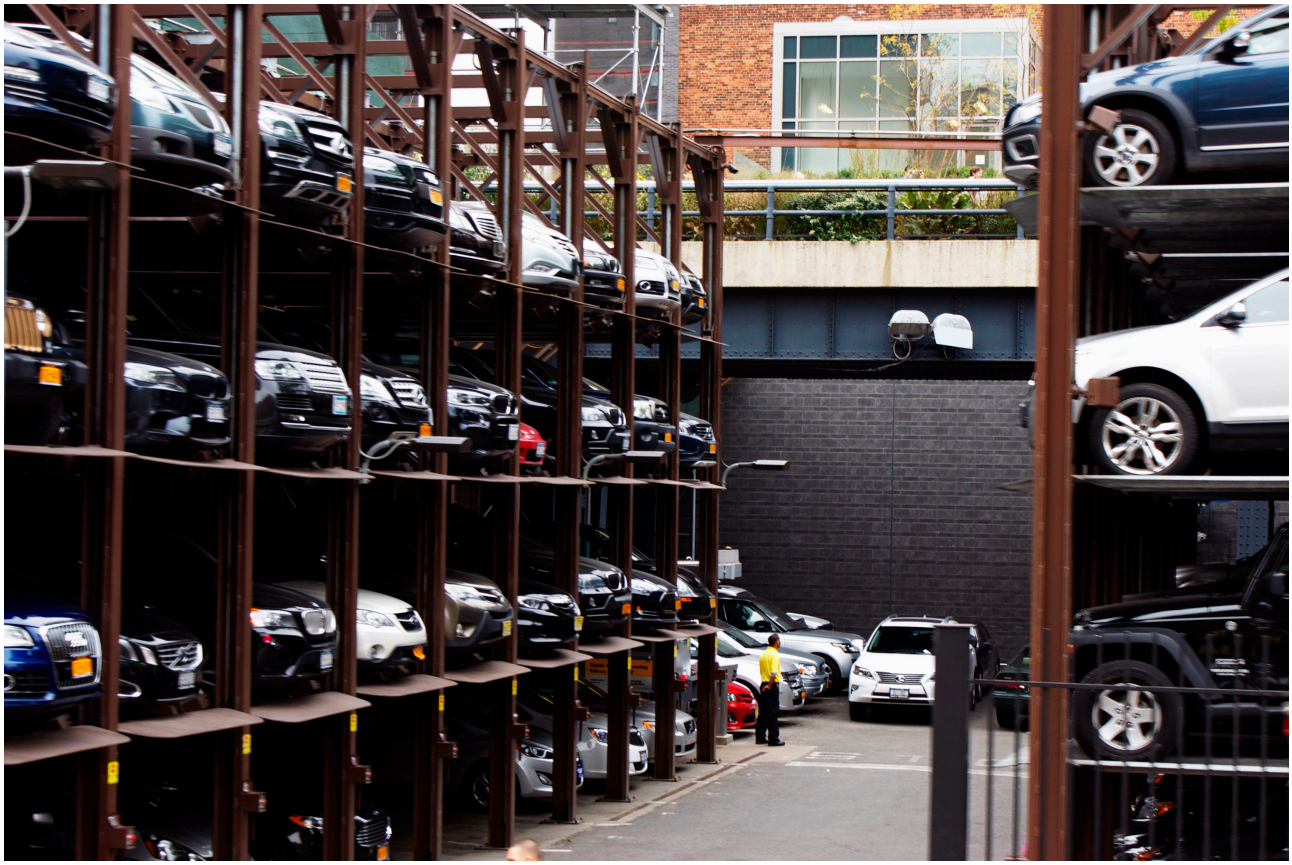
Car parks

Attractions come in all shapes and sizes so it's hard to be specific what the impact will be at this time. However some general ideas are outlined:

Existing car parks space will need reconfiguring as you will no longer be leaving cars at attractions during visits. Instead, cars will go back into a pool of cars serving other customers (especially if the attraction is in a busy city or if auto-tour vehicles are shared with an autonomous vehicle taxi service).

Alternatively, if the operational model becomes that vehicles are assigned to specific customers for their booked time, car parking will still be required while autonomous cars will wait for passengers outside the attraction

However, in this second model car parks can be much further away because you wont walk this distance; and cars can be stacked; or parked very close together, as you also won't need to get in or out of your car at at that location.



Stacked car parking solution in New York
Flickr: Phil Dolby

Set down / pickup space

Although less parking space will be required, more set down / pickup space will be needed where autonomous vehicles can safely stop, let passengers out, and drive off again (to self park).

Today's ticket offices tend to be located between the car park and main entrance, a logical layout as this is en-route for customers arriving by car.

In future, ticket offices should be located adjacent to the new set down areas.

Automatic ticket redemption

Your car will know who is inside it and will have all their ticket references for the attraction so it could drive straight into the attraction, rather than forcing you to get out, show your tickets and then enter the attraction.

If you don't yet have tickets, the car could buy them while driving towards the attraction, again making the entrance experience seamless.

Ticket office design suitable for drive through ticketing
Flickr: Stephen Bowler

Large attractions / resorts

Large resorts and attractions might decide to support autonomous vehicles on their own private grounds before autonomous vehicles are allowed elsewhere.

4.4. Multi-day tours

In today's tour market operators sell multi-day tours where customers travel between places and a tour guide is not always present. These tours tend to be more common within rural locations.

A customer might stay in Hotel A, visit that area the next day, then travel to Hotel B, and visit that area etc.

Similar to these tours, auto-tours could be provided over multiple days.

One change will be that the tour retailer or auto-tour company will contract the hotels used for multi-day auto-tours, not local tour operators as currently happens.

If existing online travel agents such as Priceline, Expedia, Ctrip, TripAdvisor etc become the auto-tour operators of the future then this will only further tighten their control of the hotel retail & distribution.

Sleeping in an autonomous vehicle

Autonomous vehicles with sleeping areas could extend auto-tours to a wide geographic region without needing hotels at all - an autonomous camper van.

Vehicles could also be designed for passengers to sleep while the vehicle is moving.

Not yet autonomous
Flickr: Apollo Motorhomes

Geographic constraints

To begin with autonomous vehicles will probably need to stay within certain areas for vehicle maintenance reasons.

However, national networks of autonomous vehicle maintenance garages could make auto-tours national and multi-national in scale.

5. Other tourism and city impacts

Autonomous vehicles could have a wider impact on tourism in cities, not just on local tours and attractions.

5.1. Hotel, restaurant and bar location

If transport within a city becomes more enjoyable, predictable and reliable, the location of hotels, restaurants and bars might not matter as much as it does today.

For hotels this could have implications for **high level location** (the region of a city) as well as **specific location** (the exact street level neighbourhood that the hotel is located in).

For example if autonomous vehicles collect you from inside the hotel's pickup zone, you might be less concerned about the reputation and safety of the area directly outside your hotel.

Restaurants and bars, might relocate to larger premises that are outside existing city *footfall* and which are (currently!) much cheaper.

This needs further exploration but is not the area of expertise of this report's author.

5.2. A new solution for private space

Three types of private space booked by travellers may be impacted by auto-tour technology:

Hotels by the hour

You can book hotels by the hour - for day use. If auto-tours are priced competitively against those services, perhaps you will book an autonomous vehicle instead.

Meeting rooms

Could you host a meeting in a specially designed autonomous vehicle? Could this impact the existing market for small meeting rooms?

Airport sleeping pods

Customers could take an auto-tour rather than stay in an airport sleeping pod.

Auto-tours are probably not a convenient alternative for flight transit / airport layover customers for the practical reason of the friction of having to leave the airport but may be suitable as an alternative for pre or post flight usage.

5.3. A new platform for destination wide games

Destination wide games, such as the 2016 Pokemon Go craze, are very popular.

What new games could be built for autonomous cars? Could you have a "capture the flag", in a real city, with real cars? What makes this possible is that this will be safe: humans won't have to focus on driving and no car will break the speed limits. A central game "controller" could issue penalties (e.g. you can't move your car for one minute)j, all you need for a city-wide game concept to be built.

Ultimately whether autonomous vehicles are used for games will be determined by the pricing model. If it is affordable by younger, early tech adopting, people, it will happen.

5.4. Configuration of city retail spaces

A recent trend with retail shopping centres that makes sense with current transport modes is to include car parking adjacent to the shopping centre. You may have to walk 5-10 minutes from the carpark to the shops but once there, all shops are convenient.

As a result older shopping streets where shops face the road are in decline (in the UK) because the friction of parking a car for a single shop visit is too high.

Shops facing the road
Flickr: Peter O'Connor

With shops on roads, autonomous cars can drive you to specific shops, drop you directly outside then drive around the corner to wait. You can do your shopping (whatever that will be in ten years time!), then, whenever you're ready, come out of the shop and find your car ready and waiting for you, with no car-parking friction.

Shopping streets currently in decline could see a resurgence while newer retail parks and shopping malls may plateau. A shopping mall's key challenge will be to build convenient access for autonomous car arriving customers, which could be a challenge build into existing shopping centre architecture.

As tourists love to shop, any impact on how shopping areas of a city may be reconfigured is a tourism impact worth considering.

6. Technology & Infrastructure

6.1. Autonomous vehicle hardware

Complex technology such as autonomous vehicles, tends to be expensive and not everyone will have equal access to it. This could result in a *winner takes all* situation, with only a few global hardware winners.

We expect that some companies will create autonomous vehicle hardware (including driving and navigation capabilities) and retail it for other partners to brand and operate it.

Only time will tell whether this will be auto-tour specific vehicle hardware or generic autonomous vehicle taxi hardware.

The companies likely to buy, brand and maintain autonomous may already exist and could be:

- car hire companies
- digitally trading local transit businesses (Uber, Lyft etc)
- local transport businesses (those currently running tours / hop on hop off services with buses)
- sizeable digital travel businesses (with access to capital to invest in this hardware, as well as the customer distribution required).

… and there could be new entrants.

Whichever companies own and operate the hardware will likely control the software layer found in their autonomous vehicles and therefore will incorporate, or not, auto-tour technology.

Branded, capital intensive, vehicles
Flickr: Steven Byles

6.2. Who's in control, the passenger's device or the car?

The car system will drive the car and avoid other cars, that is fairly clear. It is likely that the car system will also handle navigation having been directed to go from current position A to new position B.

Less clear is where in the auto-tour system architecture are the critical decisions made as to where the passenger may *like* to go to, i.e. where is the auto-tour itinerary decision making algorithm placed?

In a taxi scenario, the passenger says go to new position B and the car goes there. The car serves the passenger. The passenger makes the main decisions even in autonomous vehicles.

In an auto-tour scenario, the auto-tour system suggests position B, and the passenger says yes or no. The passenger still has the final responsibility of choice, but is assisted much more by the auto-tour suggestion than in a taxi scenario.

Model 1 - The car is in charge

The car has a method to connect to a device held by the passenger (wearable / phone etc).

The auto-tour technology is in the car itself (or in an application that is installed on the car). The passenger's device simply provides sufficient information about the passenger for auto-tour personalisation to take place.

Model 2 - The passenger-held device is in charge

The car is somehow able to take navigation commands from the passenger's device (wearable / phone etc).

Commands would be given to the car, such as "Go to Position B" and the car would then choose a route and drive the vehicle. The itinerary generation would happen on the passenger's device.

Which model will dominate?

There will be multiple car hardware providers so in all likelihood both models will be common, at least to begin with.

Each model will likely have auto-tour personalisation and routing decisions made "in the cloud", so if this is the business you want to be in, the actual car communication model doesn't make too much difference, as long as the passenger device and the car can communicate sufficiently to keep the experience frictionless.

Our preference is model 2 - a passenger device being able to direct an autonomous car.

What if there is no car to passenger device connection?

An auto-tour could be created on a passenger's device without any connection to the car.

The passenger device could output a location to go to and the human passenger would enter this into the autonomous vehicle navigation system, just as these cars will be directed when acting as a taxi.

Its not as frictionless but does at least show that car-to-passenger device connectivity is not mandatory for basic auto-tours to be possible.

6.3. City infrastructure

Popular place congestion management

The capacity of a single tour bus may be equal to between five and ten autonomous vehicles*.

While this increase in total tourism vehicles may not be felt on the roads themselves (due to the removal of stop / start based traffic congestion in regular traffic flow) it is likely to cause congestion around popular tourist destinations currently served by buses.

People will want to be set down and picked up adjacent to the place they are visiting.

Cities will probably need to manage this congestion keeping popular hotspots efficient and safe.

One solution could be to create for example ten autonomous vehicle bays in each congested hotspot, the exact locations of which are broadcast to autonomous vehicle operators.

Autonomous vehicles could then check which bay is currently available (perhaps from a city facility API of some kind), book it and use it.

These autonomous vehicle only bays could be charged by the minute, creating a revenue stream to pay for the new infrastructure. Pricing could be set to incentivise drop and collection use, rather than the autonomous vehicle staying in the bay for the entirety of a passenger's stay in that particular location.

Pricing could be yield managed to incentivise balancing out of demand.

Autonomous vehicle city control rooms

Tourism destination marketing organisations (DMOs) are currently focussed on attracting tourists (and conferences / events) to a destination so as to benefit all tourism organisations in that area.

These existing supplier-neutral services could extend their remit to managing live tourism focussed destination control rooms, whose core responsibilities would be:

- management of the autonomous vehicle drop and collection bays
- broadcasting information e.g.
  - roads to avoid (if an event is forcing a road closure) - assisting autonomous vehicles to route within a city
  - current and projected visitor levels at popular areas and attractions - enabling auto-tour operators to balance supply by altering proposed arrival times.

Creating these control rooms will enable cities to influence visitor levels in real time. This could help to address overtourism by distributing demand across an entire city.

Cities should provide these control rooms because they are seen as neutral, respected, players able to make balanced decisions, both strategic and operational, that autonomous vehicle operators would agree to adhere to.

** Exact ratio of people currently in tour buses replaced by autonomous vehicles not researched.*

6.4. Tour retailers & destination guides

Customer profile gatekeeper

For auto-tours (not autonomous vehicle transit solutions) personalisation of itineraries requires sufficient information about a passenger to create itineraries they will actually want.

Retailers of the future will be able to provide this information, which may include:

- whether the passenger is on a business or leisure trip
- passenger interests (e.g. whether they like views or active walks, or what food they like)
- what they have seen or experienced during this trip (so the auto-tour can avoid repetition)
- cultural and demographic information

Such profile and activity information will be sent to the auto-tour operator with the full permission of the booked customer passenger.

Customers will book via retailers because of the convenience of having a personalised auto-tour experience that improves as a result of multiple purchases.

Auto-tour suppliers will wish to take bookings via retailers because they will value the reduced friction of receiving customer profile information as part of a booking.

Pre-designed itinerary marketplace

One example listed earlier was a likely little requested itinerary for an Elvis themed tour of London.

Initially, such itineraries will not be custom created by auto-tour algorithms on an ad-hoc basis, partly due to the challenging nature of automatically creating, optimising and improving rarely taken tours on long tail-topics.

Instead, auto-tour itinerary marketplaces will probably exist where passengers can buy a pre-designed itinerary with all the required locations and durations set.

In these auto-tour marketplaces, tour designers will be able to create and retail tour itineraries, with customers able to buy, rate and perhaps suggest improvements - a tour itinerary wiki.

For example you could buy a history tour of London covering a very specific historical period, and written by a school history teacher, ensuring it meets all the criteria of the current school curriculum.

Guidebook writers and travel bloggers may become tour designers - selling to their own audiences or direct to anyone via the marketplace.

Such pre-designed itineraries could still be personalised e.g. by changing the order of places. Itineraries could also be combined, for example merging a food tour with a particular sports team tour.

Itineraries pre-designed in this way could include additional media e.g. audio or perhaps augmented reality, geo-triggered so that when you approach a certain place, its history would begin to play on the customer's device (phone / wearable etc).

Itinerary inserted place pay per visit “advertising”

Dynamically generated itineraries (either by the retailer or the auto-tour operator) could allow individual places to influence those itineraries.

For example, if there are two chocolate shops in the same vicinity the auto-tour personalisation algorithm might offer to the passenger some hand-made chocolates. But which chocolate shop should the auto-tour system take the customer to (assuming the chocolate shops are of equal quality and are both convenient to other places that are planned in that particular auto-tour itinerary)?

The chocolate shops could advertise on a pay per action basis, e.g. one chocolate shop could offer to pay 2 USD per customer; the other might bid 2.20 USD per customer, just like digital marketing in 2018 but paying per shop visit rather than per digital click.

The auto-tour system would know how many passengers it had delivered to each chocolate shop, so there would be no attribution challenges.

This advertising model could enable the customer to take their auto-tour for free as long as they stop (and potentially purchase) at certain sponsoring shops en route.

6.5. Existing local tour booking systems and retailers

Current SaaS (Software as a Service) local tour booking systems are mostly not suitable for selling auto-tours because they are so different to existing city tours:

- the base data unit for an auto-tour transaction is a duration based booking with an associated customer profile, and perhaps pre-selected point-to-point itinerary. The cost of a tour may not be known upfront as the duration; and other inclusions (such as other experiences), may not be known yet
- the current base data unit for most existing local tour reservations is a tour / text based tour itinerary. Bookings are an instance of that.

Existing reservation system providers should not worry about not having auto-tour operators as future customers because there wont be that many auto-tour operators.

Existing tour retailers, such as current online travel agents, need to consider how auto-tours can be retailed separately from regular city tours - each city could just have a single auto-tour which would be lost if placed within existing tour listings. Passenger profile configuration (or pre-destination itinerary selection) could be offered to begin the auto-tour customisation process, creating a more complex checkout experience than regular city tour bookings.

6.6. Hotels

This technology provides a new opportunity as hotels will have more influence upon and insight into what their leisure travel guests are doing at a destination, especially if the hotel is the auto-tour retailer.

Concierges and their digital replacements

Concierges will be able to have conversations with hotel guests about what to do at a destination; they could communicate suggested auto-tours directly to autonomous vehicles on the customer's behalf.

Such a lack of friction when following concierge instructions could help keep hotel concierges relevant in modern tech driven hotels.

Loyalty rewards

Hotel guests owed loyalty rewards could receive them during auto-tours or other transit journeys within autonomous vehicle.

For example, a hotel guest driving past a chocolate shop could be told:

> *"Go into this shop and you will be given a box of chocolates. Thank you for being such a great hotel guest"*

Left luggage

Autonomous luggage transport vehicles could enable customers to physically shop in the retail areas of a city (and not need to personally carry back to their hotel) or to leave luggage at the hotel post-checkout for them to be delivered later to the customer at their departure airport.

Inexpensive luggage storage locations could be used (such as existing self-storage buildings) instead of expensive on-site hotel storage real estate.

6.7. Including other local experiences in an auto-tour

Auto-tours will add further incentive for activity and experience providers to publish experience availability data and make it transactional using local tour distribution systems.

These systems began becoming popular from 2014 onwards and include TourCMS, the original leader in local tour distribution, founded by Alex Bainbridge, the author of this report.

Specifically required is:

- spaces remaining (& smallest booking size) per time slot

… with the following operational characteristics:

- low cutoffs (being able to book at 10 minutes notice, if available)
- immediate booking confirmation

Having this will enable auto-tours to include other experiences within an itinerary even if the customer has not pre-booked their auto-tour in advance. For example it would make it possible for a 4 hour auto-tour to easily include a zip-line experience within the itinerary.

7. Current vehicle based tour suppliers

Existential threat

Vehicle-based tour companies don't only run tours in vehicles but are often also engaged in:

- airport transfer services (e.g. airport to hotel)
- hop on hop off operations (e.g. circular routes within a city, aimed at the tourist market)
- scheduled public bus operations (e.g. circular routes within a city or long distance coach travel)
- contracted bus operations (e.g. daily transport for school children)
- private hire (e.g. a sports team or team supporters going to a match)

What happens if, for example the airport transfer sector is no longer viable for anyone? Does this impact the overall viability of the business? And this is before you consider the impact of auto-tours on vehicle based sightseeing tours themselves.

Autonomous vehicles can be larger capacity than existing cars, e.g. autonomous minibuses, so the argument that vehicle-based tour suppliers are protected from the impact of autonomous vehicles due to the capacity efficiency of large tour buses is not valid. Capacity efficiency will offer only initial competitive protection.

If you are buying new tour buses now, calculated with a ten year return on investment, then autonomous vehicles will be on the streets within your investment calculation period. Which is to say that autonomous vehicles are an issue that needs addressing *today*, not in five years time.

Autonomous minibus - Estonia

8. Summary

The most recent technology innovations to significantly change the tours & activities sector have been:

- **the web & ecommerce** - the ability to find out about tours and book before you go and review them after you have been
- **person to person commerce** - such as finding special interest tour guides
- **SaaS tour reservation systems** - managing local tour businesses in the cloud
- **tour price & availability distribution** - enabling retailers to sell local tours from realtime data
- **mobile** - booking today; and taking the tour today

There have been other marketing innovations such as the introduction of social networking but these changes have not significantly changed the local tour business for most companies.

Autonomous vehicles are next to be added to this significant change list, not just as a result of auto-tours but because of their general impact on local transit. Historical attractions are not changing location, tourists will still desire to experience these iconic sites when visiting cities and vehicle based transport will continue to offer the most efficient way to achieve this.

Auto-tours themselves are not going to impact all tours and activities. This report is not intended to be an end of times prophecy for the industry. However auto-tours *will* be on our streets within a few years; they will sell in high volume and will disproportionately impact tours currently delivered by vehicle. The capabilities of autonomous vehicles mean that fair-weather cities will be impacted first; rural areas will be last. Some areas will never be impacted, e.g. areas with no roads.

There are other forthcoming changes that will occur in the same timeframe: augmented reality (AR) and virtual reality (VR) may change what we think of or want from a tour and blockchain technology may change how we distribute tours from suppliers to retailers to customers. Projecting ahead on one technology without considering future concurrent technology changes may have introduced inaccuracy.

One thing is certain: there are interesting times ahead.

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About the author - Alex Bainbridge

Alex Bainbridge founded TourCMS, the original leader in local tours & activities reservation management & retail distribution technology. This put him at the forefront of the most recent shift in how local sightseeing tours are sold by suppliers and retailers. He successfully sold TourCMS in October 2015 and now is working on building up technology infrastructure required for auto-tours.

He has written extensively about the tours & activities sector for tnooz and now publishes via DestinationCTO.

His longest driving tour was a 4 month expedition driving from London to Kathmandu via Eastern Europe, Turkey, Syria, Iran, Pakistan and India then Nepal. This is not expected to be possible to complete in an autonomous vehicle anytime soon.

Consulting

Report author Alex Bainbridge is available for consulting on this topic.

Destinations (DMOs / CVBs) & Government organisations

Digital Tourism Think Tank
https://www.thinkdigital.travel

Alex Bainbridge is a Digital Tourism Think Tank Expert focusing on Technology. He works with destinations, tourist boards and governments via the Digital Tourism Think Tank

Other organisations

DestinationCTO
http://www.destinationcto.com

DestinationCTO is the blog / consulting brand of report publishers The Spontaneous Travel Company

Investment, job & partnership opportunities

Do you want to invest in or help build this auto-tour vision?

Please contact Alex Bainbridge **alex@autoura.com**

We have an email newsletter for our autonomous vehicle sightseeing news:
http://eepurl.com/dhHrCz