Autonomous Vehicles & Digital Experience Platforms

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Introduction

I first presented about the impact of autonomous vehicles on tourism in November 2017 at the World Travel Market in London, followed up by a dedicated slot in March 2018 at the ITB trade show in Berlin.

At the time I was confident ground based autonomous vehicles were on their way and that they would significantly impact vehicle based tourism.

What no one could be sure about was the exact timings although by September 2018 I was publicly stating that we could transition early companies that needed to by 2025.

Just prior to this period I had spent 4 years with my previous technology business (TourCMS / Palisis) building distribution & retail rails for Gray Line, one of the leading global sightseeing bus operators. I had an inside view to how the technology worked (and where it didn't), and how human driven ground vehicles are used to operate many high volume urban and out of city mainstream tourism experiences.

At the time I was considering the introduction of autonomous vehicles as an issue primarily facing incumbent bus operators. Within tourism, these companies own & operate tens of thousands of single-decker luxury coaches and double-decker hop-on hop-off buses. Some also operate shuttles & limos for airport to hotel transfers.

Since then technology and my understanding of this topic has progressed so this paper is an update to my two 2018 papers taking this new understanding into account:

- Autonomous vehicles are here and commercially operating in multiple continents
- Early indication that the web may evolve back to its original decentralised roots
- We have built our core platform and now can be experienced in 70+ cities.

This paper introduces my vision for a **Digital Experience Platform** (DXP) layer that sits between consumers and public mobility platforms. This DXP approach broadens the tourism industry impact from a narrow autonomous vehicle scope to welcoming high-frequency leisure & hospitality consumers, and retailing non-vehicle experiences.

If this approach is accepted by consumers, and if it scales economically, this is a multi-industry disruption (automotive, tourist sightseeing & leisure experiences), a scale of impact even I would not have dreamed possible when I set out on this journey.

Thank you for reading & thinking about this topic. Feedback welcome (& necessary).

Where are the promised autonomous vehicles?

Building the capability for autonomous vehicles to drive commercially in complex urban environments ferrying human riders is a harder problem than some expected, as a result not all previous timelines were met.

Not only do the mobility engineers have to solve the driving challenge but they have to be able to statistically prove that they have solved it, including the (very) long tail of edge cases. Local residents that share the same road spaces need convincing proof for them (or their elected representatives on their behalf) to feel confident these futuristic vehicles are ready to operate in their region. So do insurers.

Everything therefore centres around the safety case.

This naturally leads to a slow scale up e.g. good weather first, locations with rain next, then snow & ice later. Autonomous vehicles need to train on individual city environments e.g. a US mobility platform needs to learn and master roundabouts that are commonplace in Europe. All time-consuming but necessary & important work.

Mobility platforms need to complete these developments whilst building trust with consumers (as their life is in their hands) & launching never previously tried business models that can recoup their significant upfront R&D investment.

Autonomous vehicles in tourism

Using autonomous vehicles within tourism takes the problem to a further level of complexity as in tourism mobility **the driver does a lot more than just drive**.

For example, compare tourism with a simple taxi service where primarily the local rider may know their surroundings but just needs to simply move from A>B. Very little rider to driver interaction is required if the rider doesn't feel like talking.

In tourism, the rider may be a visitor unfamiliar with their surroundings, unable to speak the local language and beyond that, they may want an experience which requires storytelling and interaction between the driver and rider. They want to meet locals (local humans not local robots!). If you remove the driver as a result of adopting autonomous vehicles, you need to replace this interaction layer with an alternative solution.

Robotaxis now available to the public in 16 cities

The following is really going to age badly, even after perhaps 12 months post publishing. The majority of this paper is theory that should stand the test of time… but I thought it worthwhile adding a current state of play as I know there are many folk in the tourism sector who are not paying close attention who will therefore appreciate a short status update. If you want to track robotaxi scale up announcements, we have launched a website/wiki - https://rollout.autoura.com - that tracks all cities with robotaxis, service areas & times etc.

There are now robotaxis (a hailable taxi that is autonomous) available to the public in:

- 9 cities in China
- 6 cities in the USA (including 2 major tourism destinations)
- 1 city in South Korea

During the remainder of 2022 I expect (but have no non-public knowledge) that we will see robotaxis available to the public in 3 further cities, including the first city in Europe and the first city in the Middle East.

The important point here is not that robotaxis are publicly available in this city, or that city, but that fundamentally the core engineering is sufficiently complete (by multiple independent companies using different hardware & software stacks) that we should now be planning for, rather than hedging for, this technology becoming widely available.

The mobility platforms are now moving into scale-up mode, with dedicated robotaxi vehicles coming on stream from 2023 onwards.

Cruise Origin
Available on US & Middle Eastern streets in 2023

Announced scale up plans

See our robotaxi rollout website/wiki (https://rollout.autoura.com) for original sources:

- **Baidu/Apollo (**China**)** - 100 cities by 2030
- **Cruise** (USA) - 1 million robotaxis by 2030
- **Didi** (China) - 1 million robotaxis by 2030
- **Volkswagen** (Europe) - 50 cities (Europe / North America) by 2030

This is many millions of vehicles owned & operated by mobility platforms and this excludes the majority of significant platforms that are yet to announce their plans. For example no mention above of Waymo (Alphabet/Google) or Zoox (Amazon) as they are keeping their scale up plans private for the moment.

We estimate there are 18 mobility platforms with significant scale robotaxi ambitions.

The majority of geographies are much later than the early cities

In many places commercial autonomous vehicles won't be available for a decade or perhaps even two decades. This is not a global overnight change.

For major North American, European and Chinese cities, you should assume that autonomous vehicles will be part of the market makeup and if you are a bus owning tour operator in one of those regions, you should be paying attention (and taking action!)

Everyone else, e.g. many countries in South America or Africa, you can watch and learn for when your time comes. Instead Digital Experience Platforms can be applied to local human driven taxi services and micromobility such as bikes & electric scooters.

Important

Don't get misdirected by consumer & trade press talking about timelines for personally owned self-driving cars that are still a long, long time away.

What matters is the timing for autonomous vehicles that can operate commercially and these vehicles are now, in 2022, available for public use in multiple continents.

Did consumers ask for any of this?

Consumers don't get much mention in this paper as, rightly or wrongly, autonomous vehicles are coming as a push from the automotive industry rather than a pull from a new consumer insight or expressed need from within the global sightseeing & experiences industry.

This is how disruptive out of industry innovation generally materialises, so don't consider this case unique here. The same happened previously within the sightseeing & experiences industry with the introduction of:

- **Web** - enabling ecommerce such as the early online travel agents e.g. Viator & Expedia, and search engines such as Google
- **Social media** - enabling reviews such as Tripadvisor, and person to person experiences such as those operated by Airbnb
- **Mobile** - requiring reservation system technology to connect to online travel agents so that consumers could book experiences within the last 48 hours

This *not invented here* mindset also partially explains the lack of curiosity that the sightseeing & experiences industry currently has towards autonomous vehicles - if their consumers are not indicating an immediate need for it, and if it is not helping mitigate several years of light trading due to the COVID-19 pandemic, it is not an issue that needs to be talked about in 2022 and can be looked at later.

The automotive industry is making the right transition for the right reasons. We as a human race living together on a small planet need consumers to adopt shared mobility (e.g. not privately owned vehicles) in order to begin to make an indent on the significant list of challenges posed by the need to reverse the predicted global climate change.

Autonomous vehicles are generally a good thing for the climate (as long as vehicle occupancy is high, which for tourism it is, as people travel with friends and family):

> *"Our model estimates that autonomous taxis must have an average rider occupancy of between 1.51 and 1.75 – depending on homogeneity in trip timing – to achieve favourable energy outcomes".*
>
> **Source**: https://iopscience.iop.org/article/10.1088/1748-9326/ac1bd9

Better still, we need consumers to adopt active travel where possible (e.g. bikes or walking) rather than just move people out of one large human driven vehicle (a bus) into smaller autonomous vehicles (robotaxis).

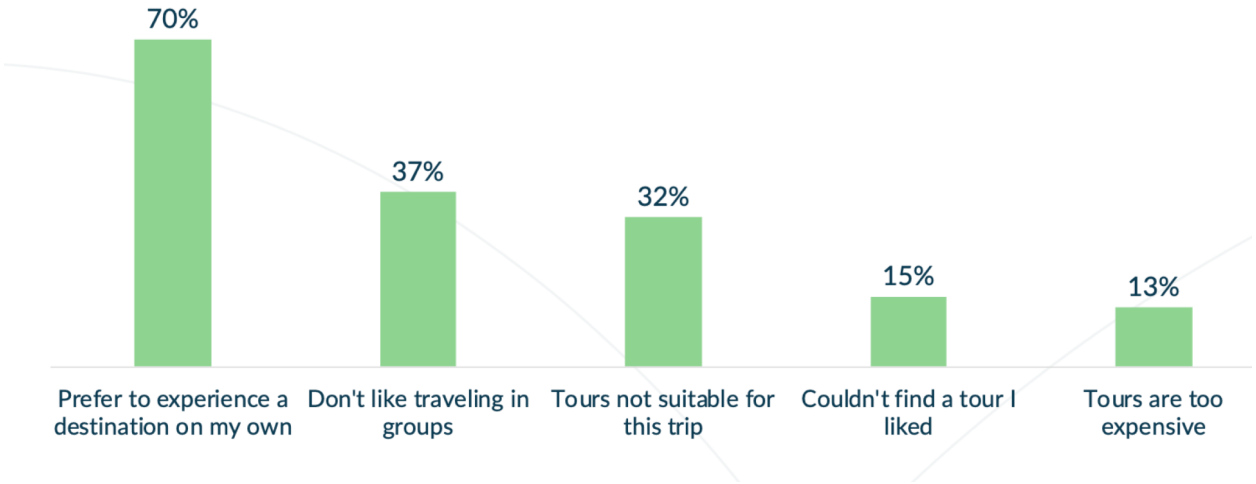
The automotive industry has to do what they have to do for the collective good.

The global sightseeing & experiences industry, as the smaller industry (although made up of a higher volume of smaller companies), doesn't have much choice but to take this upcoming change into account within current projects and future plans. Autonomous vehicles are increasingly inevitable.

Let's make a start by looking at the consumer research that may help the sightseeing & experiences industry make the best of this externally initiated disruption.

What consumer research is there that might apply here?

Reasons people do not take commercial tours



Source: Arival - Inside the mind of the Modern Tour Taker 2019
https://arival.travel/research/inside-the-mind-of-the-modern-tour-taker/

From this we can infer that there is a reasonable subset of consumers who prefer private experiences over group tour experiences.That is fortunate as autonomous vehicles are inherently smaller than tour buses so large group tours may be an early casualty of the forthcoming urban tourism disruption.

At least we don't have an impossible situation looming, but there is work to be done.

This paper discusses what strategies travel industry providers can take.

Robotaxis are unremarkable, by design

Now that autonomous vehicles are here we can see how the mobility platforms are preparing to market their mobility services to consumers in these early markets.

These early rides are generally presented as unremarkable and ready to be incorporated into everyday mobility habits.

As an example, consider this April 2022 quote from an early Waymo rider:

> ***"Any especially memorable or interesting rides you've had?"***
> *"It's hard because the rides at this point just blend in. The 10th ride is the same as the 60th"*
>
> **Source**: https://blog.waymo.com/2022/04/why-i-ride-with-waymo-dalibor.html

To us in tourism this is an eyebrow raising quote as with nearly everything we do we aim to make our experiences memorable. We would not highlight that rides blend together.

However with robotaxi mobility platforms their overriding concern is building and maintaining trust with consumers. Presenting that a ride is non-remarkable is a direct consequence of that need to build trust. Long term, robotaxi mobility platforms are always going to be overly cautious before making their rides sound cool and exciting.

Digital Experience Platforms plug this gap

The above quote from the Waymo rider continues:

> *"But one memorable ride was my first one. I took Waymo to the Welcome Center at the Golden Gate Bridge because I thought what better first ride than to go through the Presidio and see the cliffs and the bridge. That was incredible and will probably be with me for the rest of my life."*

Bingo! There is hope! Robotaxis can create lifetime memorable experiences within a leisure & tourism context using a similar approach that bus sightseeing companies have used for the last 100 years.

In order to achieve this outcome at scale, we need a new technology platform. Let me now introduce the concept of a **Digital Experience Platform** (DXP) and how it solves making robotaxi rides memorable and as a result changes sightseeing as we know it.

Digital experience platform, a definition

Gartner defines a Digital Experience Platform (DXP) as:

> *“an integrated set of core technologies that support the composition, management, delivery and optimization of contextualized digital experiences”*
>
> **Source**: https://www.gartner.com/en/marketing/glossary/digital-experience-platform-dxp-

When Gartner created this definition it is likely they were referring to screen based digital experiences rather than real world digital experiences (as you may operate using a robotaxi).

However, this definition very well encapsulates exactly what digital tour operating using a Digital Experience Platform involves. If we wanted to supplement the definition, we could insert the word *distribution*, as in tourism, distribution is everything.

As we love our technology acronyms in tourism, DXP is a worthy addition.

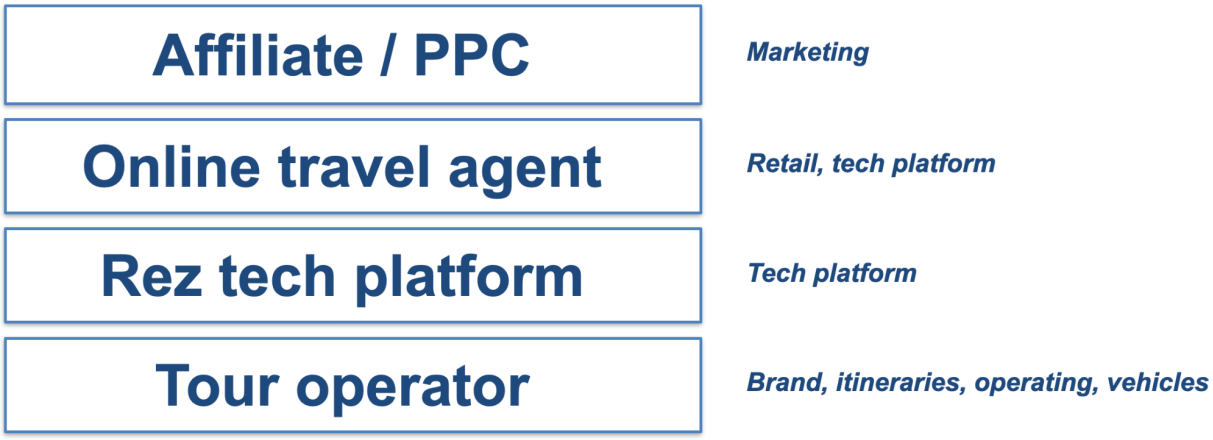
A more practical definition

A Digital Experience Platform can be thought of as digital tour operating plus all the retail and distribution capabilities of an online travel agent (2000-2022).

As a result, it is a lot of tech!

Existing industry architecture

Before I describe how a Digital Experience Platform underpins the core of a new industry architecture, let's recap how the sightseeing & experiences industry is currently structured and how we evolved to this state:



This architecture is mature although has only been fully digitally plumbed together for just over a decade (and that work continues).

Prior to this digitisation, consumers tended to book when *in destination* e.g. at visitor centres or via hotel concierges. At the early stages of digitisation, consumers started to book online at travel agents however bookings transferred to local operators via email.

An accident of history

Tour operators formed in destinations as an efficient method to group together like minded tour guides, enabling specialisation (e.g. one tour guide could then focus on marketing, another on handling bookings, on behalf of a group of tour guides). Local tour operators have been successfully trading for hundreds of years.

Then when digitisation started after the year 2000 or so, early digital innovators (of which I was one) focussed on plumbing together the entities that already existed. New entities were only added at the reservation technology layer, acting as the technology platform for local tour operators to interface with the technology platforms maintained by the Online Travel Agents.

Was this historical architecture going to last much longer?

Hard to say but likely no. Change was overdue.

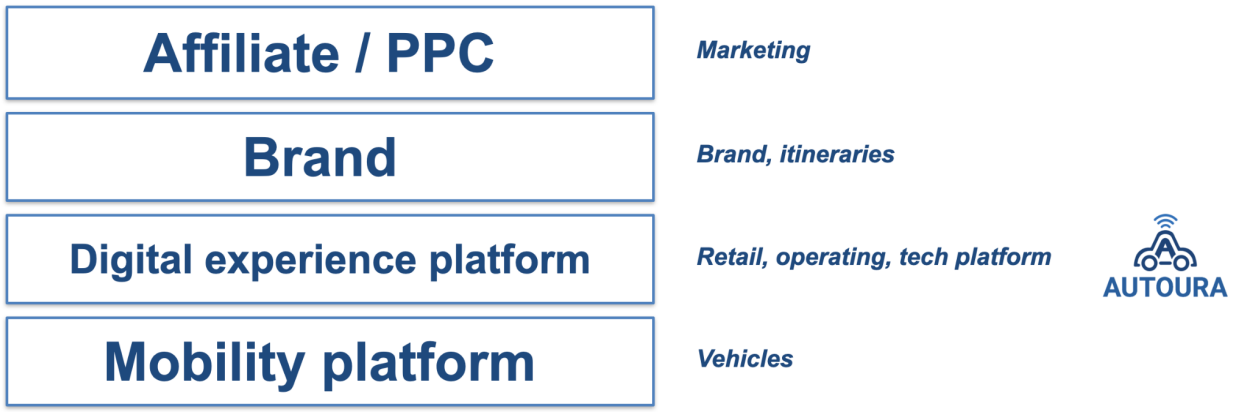
One reason there is a question mark is because the largest venture capital funded companies in the sector, GetYourGuide & Klook, are both backed on the premise of directly operating their own experiences in their own brand with their own tour guides. This is evidence that they (and their backers) don't believe in the existing industry architecture (that they also engage with).

A second question mark is that regardless of the introduction of new mobility platforms, the existing industry architecture doesn't naturally support digital tour operating, either commercial digital tours or those that are available for free.

Today (in 2022) you look for a self-guided audio tour on an online travel agent retailer's website, yes you find them, but they are often incorrectly portrayed and create significant hurdles for consumers to work out how to take the experience once booked. At the very least, this had to be changed.

New industry architecture

This is my proposal::



Four primary differences between this and the existing architecture:

- **Only one technology platform (non-vehicle) rather than two** - the technology incorporated within online travel agents and reservation technologies have merged into a single layer

- **Brand & itinerary are separated from the tour operation** - what used to be a product (brand, itinerary, operating, vehicle) within the existing industry architecture has now been deconstructed
- **Simplified money & customer data flow** - no longer are we enabling distributed retail, but this is distributed discovery
- **Vehicles are on demand** - rather than fleets owned by local tour operators, vehicles in this model are available on demand, initially hailed by the consumer as directed by their Digital Experience Platform

All these simplifications mean that this proposed industry architecture has significantly less internal friction than the existing industry architecture. Even if that is the only benefit to this model, this is a long-term inherent advantage which is why I am so bullish about it.

Is there only one way to approach this?

It is acceptable not to like the new industry architecture and to wish to tweak it, or even threaten to take an axe or something much stronger to it, or even say that nothing needs to be changed with the existing architecture at all.

If you are in this camp, my one question is, how would you incorporate:

- **Highly resourced mobility platforms** - robotaxi, micromobility & eVTOL & their soon to be ubiquitous vehicles & brand partnerships
- **Free experiences** - non-commercial experiences are necessary to reach out of the tourism market and into the high frequency leisure sector
- **Personalised experiences** - e.g. at point of discovery & point of delivery
- **Digital tour operating** - that is only just getting started but naturally will become more important over time as improvements in AI enable better voices, dialogue & depth of character for digital assistants

If you can design to support these capabilities into the existing architecture, great.

However I suggest that when you start with a mainly blank canvas as I recently did, you would end up with something that looks much like a Digital Experience Platform and associated new industry architecture.

Try this exercise yourself if you don’t believe me!

What is the consumer experience?

I like this dictionary definition of sightseeing:

> *The act of visiting and seeing places and objects of interest*

Autoura is about seeing places (plural) and objects of interest (plural) in a sequence. We refer to our sequences as routes.

In our Digital Experience Platform a route includes everything from the path (including shop opening times) plus all the prepared dialogue & interactions that the digital assistant can use to to engage with the consumer.

Who designs these routes?

For the last decade many tourism platforms have attempted to auto-generate routes for consumers to experience *in destination*, normally described as trip-planning services.

The output of these platforms can be measured against three factors:

- **Possible** - e.g. Google Maps excels at this - is this shop open?
- **Popular** - a local fast food restaurant may be popular but not memorable
- **Memorable** - an experience that people will remember (for the right reasons)

Possible & memorable are the correct goal, the original trip planning digital services became focussed on possible & popular, due to too much focus on sourcing data such as venue opening times and not enough on the emotional side of their experiences.

With Autoura's Digital Experience Platform we rely on human route designers with local knowledge to undertake the experience design. These designers focus on what is memorable whilst the Digital Experience Platform's route planning & pacing algorithms focus on ensuring a route is possible.

This is a slower scale up than the whole world first trip planning startups of the last decade, however the outcome is we have routes that people want to take, designed by locals based on their local knowledge & experience.

As robotaxis themselves have a slow global scaleup, scaling routes using a similar location by location approach is sufficient.

Route design concepts

This is not a paper about route design. If you wish to dive into this topic further, we have published route recipes for a variety of use cases: https://www.autoura.com/recipes

However three core concepts are worth spending a little time to think about:

- **Routes do not have to be commercial** - the majority are free
- **Routes do not have to be memorable** - some can just be useful
- **Routes do not have to be mainstream popular** - unusual topics are great

Commercial & non-commercial
The market price for digital travel information is free. Google Maps is free, picking up a printed leaflet with a map on is free, reading a blog post is free. As a result, experiences offered by Digital Experience Platforms have to start with a free price tier.

A route becomes commercial when it incorporates an attraction ticket or tour guide. A Digital Experience Platform handles the retail aspects of these tickets to ensure that it is available and fits within the route navigation.

We will discuss strategies behind incorporating tour guides, attractions, shops & restaurants later in this paper.

Useful as well as memorable
Think of the digital component as glue rather than the experience itself. E.g a night out may follow this structure:

1. Hotel or other accommodation
2. Restaurant
3. Event (Theatre / music etc)
4. Return to hotel or other accommodation

With this example, the restaurant needs to know that the guest is going to an event afterwards, so she should be seated quickly, and served at the right pace to ensure they can leave on time.

This particular style we call a *connected evening*. It is a shorter duration variant of what some travel technology compares refer to as a *connected trip*.

The memorability comes from the night out, not the glue in between.

Long tail as well as mainstream
Within the existing sightseeing industry, commercial tours are generally mainstream. This stems from two root causes:

- **Human drivers** - leading to larger vehicles e.g. buses (in order to share the cost of the driver over the most passengers) leading to requiring popular experiences (in order to regularly fill these larger busses)
- **Management overhead** - printing leaflets / listing on retailers / training tour guides

E.g. if you take fewer than 500 bookings per year for a specific itinerary, the next season you may drop it and design a new version that hopefully has a higher demand.

As a result, over time products naturally become more and more mainstream, just like commercial radio stations. Everything becomes popular but not loveable.

Where digital tour operating using autonomous vehicles excels is that:

- **Vehicles are small** - private by default (e.g. you & your family)
- **Experiences are on demand** - you can choose anything from the catalogue

Therefore the route catalogue can be extensive, just like today's music streaming services. People should be able to find experiences they *love* rather than just *like*.

One significant trade-off with going down the long tail is maintaining high quality.

Compare Netflix with professionally created content vs Youtube where it is amateur created (in the main). Youtube's algorithm has to do a lot more work hiding poor quality compared to Netflix that can totally focus on suggesting matches.

Various different product strategies can be taken. We expect over time there will be a mixture of professional and amateur designed routes, even on the same Digital Experience Platform.

An additional question is will routes be sufficiently warmed up if they are irregularly accessed as happens if all routes are long tail?

Expect to spend the next 10 years talking about this long-tail quality trade-off!

User interface

For the near future, assume that most interaction between consumers and Digital Experience Platforms is via personally owned devices (e.g. smartphones) using a digital assistant style interface (e.g. how you may communicate with Amazon's Alexa today).

Where mobility platforms and Digital Experience Platforms are partnered, the interface may be embedded within robotaxis themselves (primarily voice) but perhaps using the smaller screens that are common in robotaxis where consumers watch current trip status.

Small screen in Waymo robotaxi (Geely)

Independent Digital Experience Platforms will address consumers directly via their personally owned devices as partnerships with mobility platforms are not mandatory in order to digitally operate consumer facing experiences using publicly available robotaxis.

The entire user interface experience will evolve over time as voice AI, AI powered digital humans, holograms and augmented reality evolve over the next 5-10 years. Maybe Digital Experience Platforms will stream human tour guides as holograms into robotaxis rather than rely solely on AI powered experience delivery.

At Autoura our Digital Experience Platform is fronted by a character, Sahra. This gives us the opportunity to tune our interaction approach later as technology evolves. Sahra is an acronym for **S**ightseeing **A**utonomous **H**ospitality **R**obot by **A**utoura.

Sahra speaks in 17 languages & 29 dialects (including various English, French, Portuguese, Spanish & Arabic language accents). Any experience can be taken in any language in any geography.

How does distribution work?

Distribution differs to today; it is not distributed retail, but distributed discovery. There is no money handling, no customer details transfer - all much simpler than today's multi transaction layer distribution approach:

1. Routes are (human) designed & configured within the Digital Experience Platform

2. Published routes are made available via API (e.g. see https://www.autoura.com/docs/api/routes/search & https://www.autoura.com/docs/api/routes/get)

3. Consumer searches for & selects / views a route - At this point the distribution flow is much like how tours & attractions are distributed within the existing sightseeing & experiences industry

4. With their smartphone the consumer scans a QR code holding a route identifier (*Try with this QR code if you wish to*)

5. This route can then be experienced in the real world by the consumer immediately, or later. If tickets are required (e.g attraction entry or booking a tour guide) they can book those commercial components then), handled by the Digital Experience Platform

The QR code, beyond holding an identifier for the selected route, additionally holds the necessary attribution information in order that the correct branding, and correct revenue share, can be applied.

Non-QR code methods are also possible. The flow above is just one of many flows.

Enabling new distributors

One of the novel aspects of this new architecture is because the brand is applied at a different point to where it is currently applied, including applying the brand to both distribution & operating, this introduces new distribution opportunities.

For example:

- **An online travel agent (OTA)** - can use this approach to retail attractions in a more powerful way than they do currently, with more trip context, in the online travel agent's own brand
- **A destination marketing organisation / tourist board (DMO)** - can list all the experiences in their region, or design their own routes in their own brand
- **A luxury mainstreet/high street travel agent** - can design a specific experience for a specific customer, operated in their own brand
- **An all inclusive resort** - can provide experiences for their guests, starting and ending at their resort, operated in their own brand
- **A cruise ship operator** - with experiences that start and end at the correct port terminal, operated in the cruise ships own brand
- **An influencer** - can design a route, share content of themselves experiencing the route, and then operate in their own brand to their fans & followers

As an example of how potentially impactful this is, my previous business was a reservation technology provider positioned between online travel agents and leading local tour operators.

In order to create a distribution deal with a hotel chain for a full retail integration four distinct areas had to be covered:

- **Money management** - someone needed to take the money from the consumer & later payout to suppliers
- **Supply contract** - the hotel chain would need to contract with hundreds (maybe thousands) of smaller tour operators, in order to gain agreement that they can retail those products
- **Customer service** - bookings all require customer service. As booking windows narrow, this customer service now needs to be live customer service, 24/7, rather than office hours Monday to Friday
- **Descriptions, dates, prices & availability provision** - the only one of the four pillars that we, as a reservation technology provider, could offer unilaterally (i.e. without the input of our suppliers)

What happened is that these hotel chains instead went to Online Travel Agents who pitched that all that was necessary was to *sign this one agreement* and the hotel chains were able to retail experiences to their guests in a restricted way (as an affiliate).

Very little additional commercial or technical work was required as the Online Travel Agencies covered customer service, supply contracting, money management etc.

With this new industry architecture, a hotel chain can design routes starting from their own hotels and operate them to their guests in their own brand. That's it! No money management required, no supply contracting. A step change for out of sector brands.

It is also an adjustment for technology platforms. In the previous architecture the reservation technology companies were unable to offer distribution deals without their downstream supplier involvement and without online travel agents. In this new architecture, the Digital Experience Platforms are able to agree commercial distribution relationships unilaterally. A step change for platforms.

Personalisation

Personalisation is one of the key strengths of digital tour operating. (Or personalization for US readers). We consider that personalisation can be applied at two stages:

Discovery - when the consumer is considering what to do

- **Who consumers are with** - with kids, teenagers, a couple, friends or by themselves
- **Preferences** - if a vegetarian is looking for a food tour then steak experiences will be excluded
- **Budget** - whether consumers have money to spend on luxuries
- **Previous activity** - once a visitor has seen the Eiffel Tower, don’t suggest again

Delivery - when experiencing the route in the real world

- **Smaller vehicles** - no need to be in a group in a large tour bus, our experiences are private
- **Start location & time** - we start from a customers hotel or home, on demand
- **Language** - we operate in 17 languages with 29 dialects
- **Food & drink** - no suggestions to try a cocktail if the consumer doesn’t drink alcohol
- **Route** - people who are wheelchair users, or pushing a baby stroller, navigate to avoid steps

To enable personalisation at both discovery & delivery, the Autoura Digital Experience Platform uses an approach referred to as self-sovereign identity:

> *"Self-sovereign identity (SSI) is a term used to describe the digital movement that recognizes an individual should own and control their identity without the intervening administrative authorities. SSI allows people to interact in the digital world with the same freedom and capacity for trust as they do in the offline world."*
>
> **Source**: https://sovrin.org/faq/what-is-self-sovereign-identity/

As a technologist it is tempting to go into an explanation as to how this works and why it is amazing! But frankly, if you want to go into the weeds on this, read our explanation on our consumer facing preferences management website https://www.sahra.vip/what

A few examples:

- At point of discovery, a website can filter out routes where there is too much walking (if you are not so mobile), or include meat (if you are a vegetarian), or if you are travelling with kids so need to take that into consideration
- At point of delivery, a robotaxi can know your hotel address so when you are finishing a tour, they can offer to take you back to your hotel conveniently

Preferences are progressively disclosed. For example, at the point of discovery the website doesn't need to know your name. The full list of preferences we use in the Autoura Digital Experience Platform are listed here https://www.sahra.vip/what/data

GDPR / data protection

With the new industry architecture, the consumer has determined that they want to share their preferences with the distribution website. These details do not need to be shared by the distributor back to the Digital Experience Platform (as this is where the details originated from), so there is no consumer data sharing that needs to be tracked (and reversible) as a result of European GDPR data protection requirements.

Privacy done well, without cookies, with the consumer in control of their own preferences. Great!

What could travel industry providers do?

Although we are proposing a new architecture, there is a place for everyone at the newly laid dinner table. The architecture still needs:

- Tour guides
- Attractions & Events
- Experiences

However more adjustment is required for bus owners & operators.

Additionally, as there is a new architecture, existing technology companies that either form the backbone of the existing industry architecture, or plug gaps, need to reposition a little (or a lot).

Let's look at the impact on each of these in turn and where the opportunities are.

Tour guides

Some tour guides have felt threatened by what is currently referred to as self-guided tours, mainly audio tours in 2022. Reality is that most consumers don’t book tour guides at all - e.g. within a leisure or hospitality context - self-guided experiences traded in that space, not the tour guide market.

Digital tour operating takes the technology to the next level, especially when combined with autonomous vehicles.

However there are three significant opportunities rather than threats for tour guides:

- **Reduced perceived price with increased revenue** - offer human tour guides at lower perceived prices
- **Reduced booking cutoffs** - the ability for consumers to act spontaneously, starting now, from where they are
- **Widening the distribution net** - e.g. market both a food tour with a history tour, attracting distinct consumers for each, with a shared tour guide section

Let’s look at each of these in turn:

Reduced perceived price with increased revenue
For example a tour guide may offer a 2 hour tour for 80 USD, i.e. 40 USD per hour.

- 2 hours with the tour guide

If you combine this with some digital tour operating either before or after the tour guide, you can now offer a 5 hour tour for 100 USD, incorporating :

- 2 hours with the tour guide
- 3 hours digital tour operating

The perceived price is now 100 USD for 5 hours i.e. 20 USD per hour.

With technology, the tour guide can maintain a (digital) connection with their guest during the digital tour operating period. In a price competitive market, this is a win.

Reduced booking cutoffs
Consumers want to act spontaneously i.e. what can they do now, starting from where they are? However at the last minute, consumers tend to only have attraction tickets available to them rather than more experiential opportunities with tour guides.

Tour guides take time to position themselves within a destination and sometimes (e.g. for cooking classes or activities) they need to prepare ingredients or equipment.

The shortest duration that tour guides tend to be able to react (i.e. the latest a consumer can book) can be in the 2-4 hour range. I.e. if it is 09:00, the earliest that the consumer would be able to start could be between 11:00 to 13:00.

With digital tour operating you can retain this same 2-4 hour booking cutoff and insert a digitally operated period ahead of the tour guide:

1. 3 hours digital tour operating
2. Meet the tour guide

The experience can start now (e.g. at 09:00) and meetup with the tour guide at e.g. 13:00, still with the same booking cutoff. If the tour guide was not available at 13:00, the overall route would not be available, so the consumer would not start at 09:00.

This ability to reduce booking cutoffs is an important & intriguing opportunity.

Widening the distribution net
As Digital Experience Platforms push more into the long tail (as noted previously in this paper), tour guides could be left with a problem in that their own experiences remain necessarily mainstream. However there is an approach that should help address this concern.

For example a tour guide might specialise in guided tours within a particular cathedral. With digital tour operating they can design & distribute two experiences:

1. Visit cathedral
2. Digital tour operating - food tour

And…

1. Visit cathedral
2. Digital tour operating - history tour

They can now advertise both the food tour & the history tour, combining the bookings for both onto a single human tour guide for the cathedral visit.

Overall tour guide impact
Overall we still need tour guides with digital tour operating. To take advantage of these new opportunities tour guides should focus on:

- **First person storytelling** - “here is how I make the wine” rather than “here is how the winemaker makes the wine”
- **Gaining access to places unavailable to the public** - e.g. behind the scenes
- **Providing safety when doing activities** - e.g. kayak guides
- **Specific expertise** - e.g. cocktail making classes

Where tour guides do need to evolve away from is:

- **Taking people on a route e.g. multiple bars or shops** - digital tour operating will handle this going forwards
- **3rd person storytelling** - e.g. explaining how other people work

Tour guides also make great route designers for Digital Experience Platforms, so there are opportunities there also.

Attractions & Event tickets

To many attractions, a Digital Experience Platform can be considered as a retailer just like any other online travel agent.

However there are two points that are worth considering further:

- **Route designers will be contextualising your attraction into an afternoon or evening** - arguably travel agents do this already, however if influencing the context is important to you, design your own routes incorporating your attraction before others do so you can set the style
- **Multi-environment attractions - e.g. zoos, gardens, stately homes** - you may have your own audio tours etc however with Digital Experience Platforms, be prepared that other content creators may now be operating tour experiences in your environments

Car parking & arrival areas
If you are redesigning your arrival experience, do ask your architects to consider the impact of autonomous vehicles.

For example you may need to dedicate more space to set-down and pickup, keeping ground autonomous vehicles away from a dedicated pedestrian entry. Car parking can be moved further away (when personally owned autonomous vehicles are available). You may need to create a landing space for eVTOL air taxis that are imminent.

All interesting topics for discussion but not the focus of this particular paper!

Experiences

Much like for attractions & event tickets, experiences are ingredients that can be incorporated into routes and retailed by Digital Experience Platforms just like experiences are retailed by Online Travel Agents today.

Key is that incorporated experiences are indestructible i.e. they cannot be subdivided.

E.g. a food tour going from a shop to a market and then another shop is not indestructible as this can be deconstructed and reconstructed as a route within a Digital Experience Platform. However a cocktail making class is indestructible as it is in a form that can’t be deconstructed

Bus owners & operators

There is no way of sweetening this pill, there is significant disruption ahead.

Happy to talk to individual tour bus operators in private as specific strategies are likely to be very destination specific. However there are some general themes to consider if you are in an early impacted destination:

Keep your human driven buses
This is the *no action* action as it is happening by default by bus owners who are not making other preparations.

- **Gamble on robotaxis not attaining scale** - a fair gamble that I would have taken in 2018 alongside hedging should they succeed. But now in 2022, with multiple companies showing that this technology works, is this the right call? Scaling is still a known unknown
- **Convert existing buses for other experiential uses at a higher price point** - e.g. add Augmented Reality kit (AR) to the on board experience. Has to be kit that will not be common in households so that people will want to pay extra for it

Use robotaxis and other autonomous vehicles you do not own
You could sell your existing bus fleet to non-autonomous cities - e.g. Transition to operating using public robotaxis.

Operate fixed route autonomous shuttles
Shuttles are worth investigating. There are some scenarios where a fixed route autonomous vehicle may work, however it is absolutely not the case that a fixed route hop-on hop-off bus can or should be replaced by a fixed route autonomous shuttle.

Shuttles within geographically large attractions look promising.

Operate autonomous sightseeing vehicles
Back in 2018 when Autoura's mission was focussed on transition, we had a plan for a sightseeing vehicle that could be operated by local tourism companies. Reality is this is a massive project without the necessary support, we dropped this in favour of building the best Digital Experience Platform we could.

If you want to go down this path this is a 5-7 year project so you need to significantly fund and commence work on this immediately. We are keen to partner with any cross-industry collaborations sharing this ambition but are unlikely to lead this now.

Summary

How big can this get?

This paper is mainly about how it will all work rather than what happens if it does work! However, in comparison to incumbents, this is:

- **A better online travel agent for attractions** - this approach contextualises and distributes complete afternoons and evenings rather than retailing individual attraction tickets
- **A better urban tour operator** - as we operate personalised experiences, available on demand, at lower prices, than existing ways of operating day tours
- **Only one (non-vehicle) technology platform** (rather than two) - this reduction in friction makes this architecture significantly more efficient

With some acceleration from the scale up of new mobility platforms, we expect the Digital Experience Platform approach to become the dominant sightseeing & experiences industry structure, even for non-vehicle experiences.

Where does this go next?

Three distinct phases coming for robotaxis:

1. **Dedicated robotaxi vehicles** - current robotaxis (2022) are converted human driven vehicles hence don't look that different for consumers (beyond that there is no driver). New robotaxis vehicles look futuristic and will be attractive to tourists, at least to the point of *I would like to try that once*
2. **Robotaxi scale up** - what will it be like when there are 4000 robotaxis in a single city? They will be everywhere
3. **Personally owned autonomous vehicles** - 2030? 2035? This will change the industry dynamics again as there will be vehicles that can be owned & operated by hotels, car-hire companies etc.

As each generation of new vehicle technology hits the streets, Digital Experience Platforms will become more and more core to the operation of local tourism.

Keep an eye on https://rollout.autoura.com - our robotaxi rollout wiki - for the latest information about where robotaxis are today and where they will be soon.

FAQ

These are questions people have asked either directly or that come up in conversation:

Will robotaxi mobility platforms create commercially available tours themselves?
Within the sightseeing & experiences industry a standard approach is to advertise a combined price & availability for a certain date & time - e.g. this tour starts at 11:00 and lasts for 2 hours - and take pre-paid bookings for these slots from which an online travel agent earns commission.

Yes mobility platforms could take this approach, however bear in mind the following:

- **Price** - there would be nothing to stop a consumer hailing the robotaxi vehicle directly and then using an experience provided by an independent Digital Experience Platform. I.e. the mobility platforms's transport price within a tour, to make it attractive to consumers, would have to be lower than what the consumer could hail the robotaxi vehicle for standalone (remember Digital Experience Platforms start at free at point of consumption)
- **Personalisation** - part of what makes the services operated by Digital Experience Platforms memorable is the ability to personalise both at point of discovery and at point of delivery. By retailing via existing sightseeing industry channels, this opportunity to personalise would be reduced
- **Vehicle operations could be impacted** - e.g. you would have to make a vehicle specifically allocated to a certain booking, including adding some time padding. On this list, this is probably the simplest item to solve, however it does introduce constraints to operating models so may have unintended consequences
- **In app purchase rules** - in 2022, if you sell a digital product within an app (iOS or Android), you need to share 20-30% of your revenue with Apple/Google as a result of in-app purchase rules. This may change over time, however you would need the *tour* to be sufficiently non-digital in order to avoid this outcome, e.g. perhaps immutably combined with an upfront transport component
- **Still needs a Digital Experience Platform** - in order to operate the experiences

Instead, what we expect is that tourists will be able to buy e.g. a 48-hour unlimited robotaxi ticket and that ticket could be retailed via existing sightseeing retail channels on a commissionable basis. Then an independent, partnered or in-house Digital Experience Platform will operate experiences for those riders.

Creating a commercially price/available product would also conceptually work if the vehicles were not otherwise available as robotaxis - e.g. dedicated sightseeing vehicles.

Can tour operators buy or build their own autonomous vehicle fleets?
Yes, we do expect some autonomous vehicles to be available to commercial buyers.

Two points to consider:

- **You will buy what is commercially available** - this means the vehicle will be the same or similar to what robotaxi companies will be offering. This creates an economy of scale issue (both on purchasing & operating) and a product differentiation issue
- **You still need a Digital Experience Platform** - in order to operate your experiences

One path is to buy an autonomous vehicle electric chassis and put a custom body on. This shell can be specifically designed around sightseeing experience operation, enabling potentially sufficient differentiation from vehicles operated by the robotaxi platforms.

However:

- **This is a big project** - even if in a simplified form
- **You still need a Digital Experience Platform** - in order to operate your experiences

I.e get on board with the Digital Experience Platform architecture and keep your options open for later vehicle projects.

Consumers love the height & outside feel of existing tourist double-decker buses - will robotaxis be popular with tourists?
Yes we are losing that aspect of the experience with robotaxis. It is too early to tell if the benefits (e.g. ubiquity and ability for consumers to act spontaneously) outweigh the loss of the double-decker bus vehicle experience.

Robotaxis are designed primarily for mobility rather than to act as a sightseeing platform. They also, once they become normal, won't be seen as special. Open top double-decker buses, for a tourist, still feels novel as is not a daily mobility experience.

Incumbent bus operators should be delighted if it turns out that a vehicle optimised for sightseeing (i.e. with extra height) (whether human driven or autonomous) creates a sustainable differentiation vs robotaxis.

Will there be more than one Digital Experience Platform (DXP)?
Yes.

It is a significant amount of specialist development work as you need to recreate all the technology to be an online travel agent (OTA) and handle all the digital tour operations.

At Autoura we were *lucky* to have a few years to complete our build during a pandemic where we were under no pressure (or opportunity!) to push for consumer scale. Any fast follower building now will have to build and scale at the same time. Good luck with that!

Instead, just use our now fully operational Digital Experience Platform - Autoura - www.Autoura.com

If we are a tour operator and we act now, are we moving late or early?
If you are a bus sightseeing operator asking this question, and in an impacted early destination, you are already borderline late. The average length of service for a human driven bus is:

- 7 years for a luxury coach
- 15 years for a double-decker hop-on hop-off bus

I.e. any hop-on hop-off buses acquired in 2020 will perhaps need to be commercially operated until 2035 in order to pay for the initial capital financing. The modelling can be left to accountants who know their exact capital position, however as multiple mobility platforms are talking about millions of robotaxis by 2030, that is only 7 years away. You make your own mind up whether you are late or not. I considered everyone late in 2018!

For 150+ employee non-vehicle owning tour operators, you are probably used to marketing & distribution innovations where reacting late wasn't a significant problem - e.g. were you late to adopt a mobile responsive website or late to start advertising via Meta/Facebook? You probably only lost a small fraction of your bookings to competitors, and none if they were late also.

This time around it is a product innovation and the competition is not similar sized competitors from your home city. These new competitors have invested billions of US Dollars and will be aggressively scaling up, putting in place local and global distribution partnerships. Catching up from behind will be a near impossible task.

Smaller companies, as more agile, can afford to take more of a wait and see approach.

What Alex are you most excited about with Digital Experience Platforms?
I am excited by the opportunity to shift the market to the long tail and away from mainstream experiences. Solving this has been tried many times over the past decade or more, all the way back to the original Person To Person tour guide marketplaces (P2P) through to virtual experience marketplaces that achieved great traction during the 2020-2022 COVID-19 pandemic.

However if it turns out that Digital Experience Platforms find acceptance within the mainstream market, that will be exciting too.

The second aspect I have not talked about in this paper but I am excited about is the ability to measure people's enjoyment of an experience very accurately. E.g. where do people want to stay longer? Where do people cut their experience short? The ability to bring a web analytics approach to the operation of a 5 hour real world experience should mean that we can optimise experiences over time to make them outstanding (or at least remove the rough edges that we didn't know about previously.)

Can existing sightseeing & experiences technology distribute digital tours?
Yes, but not without removing all the features that make the digital tours special. Take a simple example, where we have start & end point personalisation:

1. Start at hotel or other accommodation
2. Food tour (multiple shops / markets etc)
3. Return to hotel or other accommodation

With digital tour operating, the consumer can start and end at their hotel, they don't have to go to a specific start point. If they are too far away from where they need to get to, they may need to hail a robotaxi. Or they may be able to walk. It depends and the options change over time - e.g. walking may initially be possible (for someone without mobility issues) but 20 minutes later, only hailing a robotaxi may remain a viable option.

How would you fit this into existing distribution & retail technology? Would you distribute every one of the variants i.e. one for each hotel in the destination? Would you try to use existing hotel pickup functionality that some reservation technology platforms offer?

Very messy indeed - instead this personalisation is best handled on demand by the Digital Experience Platform. I.e no, much existing sightseeing technology cannot be applied to digital tour operating.

We have had micromobility in many cities globally for the last few years? Why hasn't that had the same tourism industry impact as suggested in this paper that is imminent as a direct result of robotaxis?
The larger companies in urban tourism tend to be sightseeing bus operators not bike tour operators so they were not significantly impacted by the presence of cheap, ubiquitous, bikes & electric scooters.

Using public micromobility for bike tours is generally a *vehicle as the experience*, whereas ground autonomous vehicles it is all about the *vehicle as the glue*.

It is the ability to use autonomous vehicles to glue multiple experiences together into a coherent afternoon or evening that makes robotaxis so impactful.

What about eVTOL, should we be considering them also?
Yes. We are still in the early stages of understanding what business model & consumer price various low passenger capacity (e.g. 2-4) flying vehicles will adopt. Will they be more like short trip taxis or for longer flights between airport & hotel, or city to city?

EHang 216 (2 passenger capacity)

We expect them to be positioned somewhere in between micromobility and ground robotaxis. They will be partially *vehicle as the experience*, disrupting higher cost helicopter experiences that are available today. They will be partially *vehicle as the glue*, extending the scope of affordable afternoon and evening experiences.

One to keep an eye on, likely to need a Digital Experience Platform within their consumer facing architecture also.

About the author

Alex Bainbridge is the CEO & CTO of Autoura, a Digital Experience Platform for real world experiences. Beyond writing papers such as this, he still writes code on a daily basis.

Previously, Alex founded TourCMS, the original leader in tours & activities online travel agent distribution providing reservation system and distribution technology to hundreds of local tour operators, and ran that business for 10 years until its successful sale to Palisis in October 2015.

He has a degree in Applied Computing, graduating 1995.

Related publications by the same author

Sightseeing & experiences

2010

55 travel ecommerce tips for specialist tour operators, travel agents & activity companies
https://www.destinationcto.com/docs/55_travel_ecommerce_tips.pdf

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