The airline industry is one of the most effective users of IT – even though you see no evidence of that fact in the form of profits. Perhaps it just proves that using IT well to implement a broken model gives you...a broken model.

But consider this: The airline industry was one of the earliest users of computers and information systems. The Sabre system (developed by American Airlines parent AMR Corp.) led the way in transaction processing and scheduling, and later American Airlines itself led the way in “revenue management” (the art of dynamic pricing and, until the advent of the Internet, an effective way to price-discriminate) and with its AAdvantage frequent flyer program, now in its 26th year. With that head start, and given that the distribution (as opposed to delivery) of travel is really just the movement of information, travel quickly became the largest segment of e-commerce.

Cut forward a decade or two, and Expedia, Travelocity (spun out of Sabre and then bought back) and Orbitz changed the industry forever by making supply visible to consumers – while Priceline helped maintain overall public prices while increasing load factors, by creating below-market pricing while keeping it invisible. The next, non-quantum step came from Sidestep and Kayak, which allow users to state their demands, see the closest matches to existing supply and navigate to those suppliers’ websites...but these services don’t actively communicate demand to the suppliers.

The next big phase shift will come from a new group of air-service players (mostly equipped with very light jets, or VLJs) who will make latent demand visible to suppliers, using online interfaces not...
to publish information but to collect user travel requests and use them to schedule and price flights dynamically. In other words, they will use the visibility of demand to create and define supply, in the form of specific flights that would not otherwise have happened. That represents a dramatic departure from today’s supply-driven legacy airlines.

A number of companies are already offering some form of air-taxi services, even though the VLJs from Eclipse Aviation and Adam Aircraft that most of them plan to use are still not in regular production and won’t be certified by the FAA until this summer at the earliest. Some air-taxi operators are outgrowths of air-charter operations; others are green(air)field startups.

The players have different business models, ranging from “van” (individual strangers in the same plane) to “limo” (one person or group to a plane), short-haul to medium-haul, with ranges of assumptions about pricing, timing, ownership of aircraft and other parameters. They will be competing for aircraft and financing as well as for customers and visibility. and for sure, they will all be tweaking their models over the next few years.

Overall, the next phase of the market depends on three big tech-related developments (in addition to lighter, cheaper-to-operate planes):

- better software for capturing demand and optimizing resources to deliver supply in near-real time.

- use of the Internet to market the service and surface demand – though, as required by the Department of Transportation and the FAA, not to publish schedules, fares or availability; suppliers are limited to offering services between specified destinations and inviting the customer to specify his needs. (SEE PAGE 5.)

- CNS (or Communications, Navigation and Surveillance, the new politically correct term for air-traffic control) systems that allow a shift towards peer-to-peer traffic man-
agement and promise to radically improve the quality and quantity of information that pilots get, as envisioned by both government and the private sector. The current system – which assumes about 6000 ATC-monitored aircraft in US skies at any one time – cannot scale to the planning case of 20,000 aircraft at a time (by 2025) without a substantial change in how traffic is managed. Air taxis won’t lead that change, but they will be in the vanguard of the parties benefiting from it.

In short, this market is unusually dependent on good modeling – both in overall business strategy and day-to-day operations.

The case for air taxis
Why all the excitement about air taxis? Isn’t it just a clever new positioning of the same old air charters for the rich and the upwardly mobile? Add some vendor-generated excitement about some new jets, and you still just have...air charters.

But in fact there is something new, just as Federal Express was a quantum change from the package-courier and air-freight companies who dismissed the chances of that start-up in the late ‘70s. Although there are many variants and wannabes, the primary market for air taxis will be not the rich and idle, but the straining and productive, for whom more time is more money (and who are being driven out of the airports and onto the roads by the crowds, the security lines and the sheer unpleasantness of commercial air travel, at least for “short” trips of up to 500 miles). The pitch is not comfort while you’re aloft, but more time on the ground to make an extra sales call before getting home for dinner. The service is not aimed at people who currently fly around, either in private jets or on deeply discounted long-haul routes; it’s aimed at people who live away from hub cities and typically drive to other non-hub cities (although they may take a commercial flight from time to time). Thus the competition is not a high-end charter, but a low-end, productivity-sapping hub-and-spokes commercial flight that takes all day and a hotel stay, leaving room for only one sales call.
The challenges are three: optimizing effectively to sell service per-seat (an order of magnitude more difficult than per-plane), operating a high-utilization, high-volume service with minimal glitches, and finding travelers in sufficient number within a market to achieve the density of something closer to a mesh than a network.

**What is an air taxi?**

For all this to happen, the models have to work. They have to work on the grand, conceptual scale – and then they need to work real-time in the computers that do the pricing, scheduling and route optimization. The operators need to manage increasingly complex businesses, fuel needs to continue to be available (if not cheap), air-traffic management needs to scale, and the economy needs to continue to expand despite threats of global warming and rampant pandemics. But aside from these exogenous factors, air taxis look ready for take-off.

Air taxis are a fundamental change from the air-charter business, even though many air-charter operators are jumping into the fray, adding “air taxi” to their marketing. We think a few such companies may be successful – just as Airborne and DHL ultimately figured out overnight package service – but it will be a challenge. It’s clear that higher utilization, greater public accessibility (mostly online), and smaller, cheaper aircraft will force a sea change of lower prices and dramatic growth in the low end of the charter market, even as traditional airlines and privately owned aircraft continue on their own trajectories.

The real issue is not which specific business models “qualify” as air taxis, but rather the advantages/disadvantages of each, and more importantly, how well each company implements the model it chooses. Therefore we use the most inclusive definition of air taxi, without asserting that all variants are equally worthy. The best players will learn from one another and will differentiate themselves – or they will copy the strategies that work!

The broadest definition includes these features (as opposed to strict criteria):

- Focused outside hub airports
- Faster than scheduled air carriers for most point-to-point travel
- Four to five passengers on a plane (though some take more and some less)
- One or two pilots
- High utilization of aircraft (via optimization of resources)
- Cheaper than a charter
WHOM DO YOU SERVE?

A different take on business models, focusing on target markets, comes from Paul Masson of StarNet and the Personal Air Transportation Alliance. They are:

- large-fleet (in relative terms) air-taxi operators targeting business travelers originating close to urban areas, who will be serviced within a well-defined region (this permits a high utilization rate). These include DayJet, Linear Air and (eventually) Pogo (PAGE 17).
- On-demand (with a day or two of notice); no fixed or published schedules
- Sold by the plane or by the seat
- Clear, all-in pricing, by distance, time or zone, with no “extras” (deadhead fees, wait time, fuel surcharges, pilot overnights, etc.)
- With own aircraft, leased aircraft or “partners”

- smaller fleet operators targeting rural business travelers or niche markets of high-net-worth individuals; that’s SATSair (PAGE 28) on the former and Way To Go (PAGE 18) on the latter, though Way To Go plans to expand over time.
- small hybrid charter/air-taxi services that will opportunistically fill planes with on-demand passengers on a best-efforts basis when the occasion arises.

Aviation Industry 101

Before we go any further, we need to provide some background. People in the industry may safely skip the next four pages to page 9.

What Part are you?

First, the FAA has three major designations for air transportation, as described in the Federal Aviation Regulations (FAR):

- FAR Part 91, which is private operation of aircraft by their owners or owner-designated operators, usually referred to as general aviation. Compared to the other “Parts,” 91’s regulations are relatively limited. However, owners cannot charge other passengers to fly under Part 91, nor can they (officially) even ask their friends to share costs. (The assumption is that a plane’s owner knows enough to look out for himself and has an interest in ensuring safety for himself, but shouldn’t be incentivized to be careless by getting money from passengers.)

In response to this restriction on receiving payment, a company called NetJets (PAGE 8) pioneered on a large scale the “fractional ownership” and then the card programs (for a membership card which represents a sublease of a NetJets fractional share owned by NetJets itself). These are
schemes whereby a single aircraft has multiple “owners” who share in the costs, while a single operator (i.e. NetJets or its competitors) manages the aircraft for all of them. (NetJets also operates under Part 135, below, where this system works to better advantage.)

- And in response to NetJets et al., the FAA developed Part 91K specifically to regulate the card programs. They are now limited to 16 owners per plane under 91K; they are something of a polite fiction because the “owners” are really just passengers and share in such a large fleet that they may rarely if ever fly on the plane they “own.” However, the owners do have some special rights, including guaranteed access to a plane (and, with shares in a plane, the attendant financial costs and tax advantages).

Ironically, in the old friction-full world of safety regulation, ownership meant something, but now it’s just a financial transaction with limited implications for operational control or involvement. The ease with which complex corporate structures and partnerships can be created raises regulatory and practical challenges. . . as anyone knows who has ever lost baggage on an interlined flight or tried to deal with the intricacies of figuring out who’s responsible for problems on a code-shared flight.

- FAR Part 121 for regularly scheduled commercial service (e.g. American Airlines, JetBlue, ComAir and the like). These are the airlines familiar to most of us. You won’t see VLJ’s operating under this part, because the rules require that jets providing scheduled service be “certificated” by the FAA under standards for large transport aircraft, which are not being followed by VLJ makers.

- FAR Part 135 for on-demand passenger charter operations, for aircraft with fewer than 30 seats and less than 7500 lbs. payload capacity. The air taxis generally operate under Part 135. Scheduled service under this Part is limited to four round-trips per route per week, and only using turbo-props. For this reason, anyone operating under 135 with a VLJ is limited to on-demand operations and must avoid offering public, scheduled service routes. (That is, you can’t show the user a scheduled flight at 2:15 pm. You have to ask when she wants to go, perhaps within a time window. . . and then negotiate on the basis of that request.) Some operators say they will simply contract out to a third party any service that becomes too “regular,” but that will introduce complexity – to say nothing of using a technicality to avoid the rules.
General aviation economics

Here's a look at the basic business models for operation of private aircraft – whether as a private owner or as an air-taxi or charter operator.

Of course, these numbers are all approximate and vary widely within the categories, but they give some idea of how the numbers work.

<table>
<thead>
<tr>
<th>Owner-operated</th>
<th>Charter</th>
<th>Card programs/fractional ownership</th>
<th>Air taxi per plane, on-demand</th>
<th>Air taxi per seat, on-demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours/year/plane (includes up to 30 percent non-revenue for dead-heads)</td>
<td>100-300</td>
<td>200-900</td>
<td>700-200</td>
<td>900-1200 with goal of reduced dead heads</td>
</tr>
<tr>
<td>Price per mile (varies with fuel and type of aircraft)</td>
<td>Direct cost of $1 and up</td>
<td>$8 and up for VLJs, with frequent extra charges</td>
<td>$12 and up but generally more expensive; includes prorated ownership costs (and deductions)</td>
<td>$3-8</td>
</tr>
<tr>
<td>Total planes in operation</td>
<td>n/a</td>
<td>6500, including 1950 business jets and 1100 turboprops</td>
<td>600+ regular fractional, 200+ equivalent in card programs</td>
<td>&quot;borrowed&quot; from air charter; 100s coming online soon</td>
</tr>
<tr>
<td>Ownership of aircraft/financial implications</td>
<td>Individually or corporately owned, tax-deductible</td>
<td>Owned by individuals or corps. Managed by charter operator. Operator typically pays off capital and fixed operating costs to owners.</td>
<td>Fractionally owned; up to 16 owners. Owners bear share of capital/maintenance costs (pro-rate for how much they fly) and their own direct costs.</td>
<td>Charter model (owned by indivs and leased) or owned by operator and typically financed with debt.</td>
</tr>
<tr>
<td>Annual revenues</td>
<td>Owner-operated</td>
<td>$1 billion</td>
<td>$3 billion fractional, $400 million for cards</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Over on the left-hand side of the chart you see a number of rich people and companies who own aircraft and who generally at least get tax benefits from depreciation and perhaps interest-expense deductions. However, most of them don’t make anything like full use of their aircraft, and a host of operators and managers emerged who would manage the aircraft and fly them for other people (charter operators – column 2).

Many of those operator/managers work for several owners. They run small businesses where they operate airplanes and sell flights to unrelated passengers (Part 135) as revenue-producing charters, and return some of the revenue to the owners. Using planes owned by someone else is the main mechanism for aircraft financing in the traditional charter business, though in other respects they are regular service businesses. They operate with varying degrees of efficiency, and with varying degrees of scheduling tightness. After all, each aircraft’s owner still has primary call on its use, and the extra charter income is just that – extra income. About 90 percent of all charter companies operate fewer than 10 airplanes. Most of them also perform maintenance and give flight training for extra income.
Next are the fractional-ownership/card programs (column 3), most notably NetJets. Rather than work for individual owners, as noted, NetJets formalizes the model and makes all its passengers into owners. NetJets gets the benefit of running a business, albeit a high-class, premium-service business, rather than catering to the whims of a bunch of millionaires with jets. NetJets has almost 500 aircraft; or rather, it manages them on behalf of the “owners.”

For their part, NetJets’ and other “card” customers get the ability to say the words “my jet,” even if they have only one-16th of a jet (and it’s not their own jet they’re flying on), and of course they get the attendant (pro-rated) tax benefits. But there’s one financial irony to these programs: The more a single owner flies, the less his cost per mile, as the fixed costs are spread over more miles. But for a fractional owner, the costs per mile remain constant: The more hours you fly, the more of the plane you “own” – and pay for. Let’s face it, the tax benefits probably don’t offset those costs.

But the card programs are wildly popular, even though they end up being high-priced, partly because they are the only option available today to business executives and high-net-worth individuals who don’t want to own an entire airplane and can’t rely on best-efforts charters. Like new consumers in emerging markets buying shampoo in single-wash packets (because that’s all they can afford) even though the jumbo size is cheaper per wash, so are many jetsetters overpaying.

Note the conundrum: Charter costs (including for hybrid charter/air-taxi operators) are artificially low because of the market inefficiency that allows charter operators to take advantage of owners’ willingness to finance the capital portion of aircraft operations at well below “market” prices. At the same time, overall, true costs (for the owners) are generally high, because so many of the aircraft are underutilized. Some private jets are flown only a few hours a month, with only one or two passengers. How that balances out in prices to charter passengers varies a lot.

Adds Andy Cunningham of Way To Go, a startup air-taxi service (PAGE 18), “The way pricing is handled in the traditional air-charter [and fractional] business is a bit misleading. A charter operation can claim that it is chartering its King Air for $XX per hour, and that could sound pretty cheap and pretty competitive with us or DayJet or Pogo. But in reality, the charter company also charges for dead-head time and wait time.” (Dead-heads are a non-revenue empty leg resulting from a one-way trip.)

But replace that $15- to $30-million Gulfstream with a $1.5-million Eclipse 500 or a $2.25-million Adam A700, which is also cheaper to operate, keep it in the air 5 to 6
hours a day with 3 to 4 passengers, and you get completely different economics, different pricing and a different target market.

That’s the vision of the per-plane air-taxi operators (column 4) and especially of DayJet (column 5), with its per-seat, on-demand model.

**Air-Taxi Business Environment**

**The drivers**
The new air-taxi businesses will get leverage from a variety of factors, though not all the players will use all of them. Some of these are genuine, long-term advantages of the new on-demand air-taxi model; others, notably items four and five below, are likely to diminish over time. They are artificial creations of tax policy, market opacity and legacy regulations.

First, and simplest to understand, is the use of new, cheaper aircraft. The Eclipse 500 sells for about $1.5 million and costs about $1 per mile to operate, depending on fuel costs, with capacity for three or four passengers (assuming two pilots). Starting with manufacturing processes designed for scalability, the plane is engineered for mass production, high utilization and low operating costs. The Adam A700 weighs more and costs more – $2.25 million for an equivalent model, and costs about $2 per mile, but with room for six passengers (along with two pilots).

Currently, regulations still require two pilots on an air-taxi jet (at about $65 per pilot per hour), but that is likely to change soon. Depending on the operator, pricing can be per-seat or for a whole aircraft; per-seat makes sense for individual travelers, though some providers (and customers) see the corporate, whole-plane market as more appealing (and a simpler set of regulations to navigate; see page 5). Note that none of the very light jets is even certified yet; all have yet to establish a track record for high-use reliability. (By contrast, the two most frequently cited propeller planes have pretty good track records. The Cirrus SR 22, used by SATSair, for example, has seen more than 1 million hours of flight across 2600 aircraft since 1999. The Cessna Caravan, used by Linear Air, has seen 8.4 million flight hours over about 1590 aircraft.

Second is the use of secondary airports closer to the customers, with lower traffic volumes, lower fees and cheaper fuel. That reduces costs for both the operator and
the customer, and improves the user experience; it also usually enables the customers to fly closer to their destinations (other than for large metro areas, which are not the market sweet spot anyway). Over time, these airports may be subject to looser regulatory constraints and (relatively) lower user fees, further enhancing their attractiveness.

Third is a shift from the huge inefficiencies of the current general aviation system, partly driven by outmoded regulations, in which the typical privately owned aircraft is often used only a few hours per month. The new air-taxi companies are determined to make much more effective use of aircraft, employing a variety of optimization techniques and designing their operations to minimize empty legs, whether they are scheduled in advance or dynamically. New computer systems and modeling techniques allow for much better utilization of aircraft, personnel and infrastructure.

Fourth is the looser (or at least less comprehensive) regulations governing unscheduled as opposed to scheduled carriers – although those same regulations can also foster cumbersome, perverse work-arounds. For example, to qualify as a more lightly regulated Part 135 on-demand charter operator rather than as a Part 121 scheduled service, an air-taxi company may subcontract the flying on a particular route – which complicates corporate structure, reduces the company’s operational control and may perversely misalign incentives to the customers’ detriment.

Fifth is the financial structure. As noted, many aircraft owners lease out their aircraft as a way (they hope) of recouping their investment, or at least offsetting some of the costs. The burden of ownership and maintenance costs is borne, often unwittingly, by the owners. This market anomaly, which benefits operators as opposed to owners, is likely to disappear over time: The air-taxi model stands to help the existing owner base to reduce its costs further by helping it to market – or find the latent demand for – its excess capacity. Assume an increase from the typical 200 to 900 flight hours per plane per year to an average 900 to 1200 hours, and you will create a new industry with minimal capital investment – though substantial requirements for additional pilots and other operational resources, maintenance, and of course marketing and other spending. (For comparison, the average commercial airliner flies 3000 to 5000 hours per year.)

Whether there’s a fundamental contradiction in this hybrid model, where air taxis use owner-controlled capacity, is for the market to determine. Certainly, it reduces the capital cost of capacity, but it may lead to operational or control issues that hamper the company’s ability to deliver good service. In the end, all we know is our expe-
rience with Federal Express: Although we’re not sure of the exact figures, we know the vast majority of its minimal service problems come from the use of third-party services to reach out-of-area customers. That argues for the DayJet/Way To Go/Linear Air/Pogo approach, where you have ironclad control over your operations – and first call on the resources when the going gets tough.

A final factor will be the likely and necessary change in air-traffic management over time from a centrally controlled, hierarchical air-traffic control (ATC) system to a peer-to-peer architecture. This is a politically sensitive issue (as the commercialization and privatization of the Internet once was), but it is inevitable. In the future, though we don’t know when, aircraft will mostly communicate directly with the ground and with one another, rather than with human controllers. GPS will become more important than instruments and landing towers, allowing more use of small airports without towers and instruments even in bad weather. Overall, new CNS technology will let traffic scale at limited cost while improving safety. In fact, this kind of integrated technology is already being tested by the Swedish airline SAS in Stockholm and Vienna, in a test co-managed by Avtech, a Swedish aviation systems integrator/consultant (see page 34).

The challenges
Let’s return for a moment to the FedEx example. FedEx created a new business in its time by simplifying the logistics – everything through Memphis overnight – to avoid complexity and inevitable errors. Packages fly overnight and aren’t sensitive to an extra hour or two, while people typically fly in daytime, during their most productive hours. DayJet, in particular, is swinging into the complexity, optimizing for use of resources and high granularity (as permitted by its three-passenger planes). If you have the right information systems, complexity is no longer a source of cost; the matching of the complexity of people’s desired travel patterns with a set of resources is actually a competitive advantage and an opportunity for cost reduction. In short, this is customization of travel, instead of mass production.

Beyond that, there’s the marketing. FedEx used to run television ads showing that you didn’t have to be a big business to use the service. Remember “Hello Federal!”? Some air-taxi suppliers are suggesting that “you too can fly in a private jet.” We think that will reach one market segment. But we think the broader, more successful pitch will be a variant of American Airlines’ “We know why you fly!” ad campaign. American no longer fights passenger cynicism by promising friendly skies or comfort; it simply promises to get you off the plane and into the arms of your loved one,
in front of a plate of grandma’s cooking, or next to your customer. Likewise, air taxis shouldn’t promise “glamour”; they should sell to CFOs and to the inner CFOs of traveling businesspeople everywhere: “Spend more time being productive, and less time on the road or in the sky!” The lure is not price per mile, but price per hour saved. Those hours saved could run anywhere from below-zero for a flight between two well-served hubs for someone who lives near one airport and is going to a meeting at an airport lounge at the other (not the target market), to many hours of car time and even an overnight stay for someone traveling between two locations not served by a major airline. If your time is worth $200 an hour, or if an extra sales call could mean a $20,000 or even a $20-million sale, the air taxi is cheap.

We don’t know how many people are susceptible to that argument, but we’re confident it’s a large number. Indeed, the air-taxi operators face an educational as well as a marketing challenge. How many people even know how to book a charter, let alone an air taxi? Where would you go? What would you ask for? The air-charter market is notoriously opaque, with frequent surprise add-on charges. How many people know the location of the nearest small airport? Probably even fewer than know the name of the current chairman of the Federal Reserve (Bob Bernanke, before you ask).

That’s the next challenge – as with Federal. Once they want it, people need to know how to get it. That’s the problem Gavin Stener of Corporate Clipper (page 21) hopes to solve on a broad, corporate-traveler basis, while DayJet and others will be addressing it within regional markets, at least to start.

**A little more on the context**

All these startups are entering a market of uncertainties. Beyond the questions about the customers, there are questions about the shape of aviation itself.

Currently, everyone agrees, the system is in crisis. On one side, you have commercial, scheduled aviation, with crowded airports, long security lines, low prices and full planes, and little slack in the system when anything goes wrong. The air-traffic system is stretched thin in congested times and places, and schedules go haywire whenever there’s a storm or a “mechanical.” This in part reflects excess demand created by artificially low prices, with capacity offered by money-losing legacy airlines who often aren’t paying the full cost of capital.

At the other end of the spectrum, little airports are quiet, dusty places, with empty runways welcoming the odd plane or two during the day. Some of them don’t have
control towers; pilots land using non-precision approaches or visual flight rules, or don’t land at all in bad weather. (It’s unlikely that the federal government will pay to add instrument landing systems at these airports, but with a more modern CNS that won’t be needed.) Getting onto a plane is easy, with no security lines at all (based on “known” customers), while getting into the air is usually easy, with lots of airspace to spare outside of major metro areas. In addition, thousands of small aircraft sit idle, often flying 500 or fewer hours per year because supply can’t find and fill the demand that would surely be there if it only knew about the supply.

The air taxis fit squarely into this second part of the market. They will fill holes rather than stress capacity, making use of existing facilities and in many cases even existing aircraft. The air transportation system is infrastructure-intensive; consider air-taxi passengers as the airborne equivalent of people who do their laundry late at night when energy demand is low.

Nonetheless, air taxis will operate in the context of the broader air transportation market, which we will consider on page 36. One issue is the structure of the overall air-traffic system, and the other is how it should be paid for. (SEE PAGE 40.)

**The Players: Model, Model, Who’s Got the Model?**

Below, we describe a number of the air-taxi players in depth. We start with Linear Air, already operating an air-taxi service using Caravan turboprops and testing – or building – the market. Next is DayJet, the – call it extreme, or call it the essence – of the new model, with a dedicated fleet of Eclipse 500s, per-seat scheduling and pricing and ambitious plans to blanket the Florida market and then expand. Next is Way To Go, a more typical start-up based in California and targeting a higher-end market through B-to-B marketing, and Pogo, one of the first air-taxi companies to announce itself, but now, under CEO Robert Crandall, biding its time and waiting for the perfect aircraft (which it does not believe exists yet). OneSky and Corporate Clipper are both intermediaries that will help deliver demand to air taxis as well as to more traditional charters; OneSky provides capacity and takes pricing risk, earning money on the markup, whereas Corporate Clipper sees itself as an agent for the demand side, working mostly with corporate travel departments and captive corporate travel agents. Finally, SlipStream Air is an arms merchant to the industry; it sells (as an application service provider) software for charters and air-taxi companies, including hosted, customized websites for them to reach their customers.
Linear Air: Training wings
Linear Air is already operating an air-charter service using Cessna Caravan turbo-props as a proxy for the Eclipse, mostly in the Northeast. The company started up in 2004, and has been collecting a base of about 600 customers (400 of whom have flown more than once) and 5000 prospects. Founder Bill Herp expects many of the prospects to buy service once Linear starts operating jets in air-taxi mode with a broader range of destinations. He figures the “ramp appeal” of the Eclipse (and its speed) will enable him to charge the same mileage-based price for a flight on an four-passenger Eclipse as for a flight on the eight-passenger Caravan.

Herp is a longtime database marketing entrepreneur, and so he sees his current business, running a little below breakeven, as mostly a marketing effort for a future Eclipse-based air-taxi business. The service skirts the edge of scheduled service by taking advantage of the four-scheduled-flights rule: Since its flights from New York and Boston to Nantucket and Martha’s Vineyard become fairly regular over the summer, it takes care to offer only four roundtrips on a per-seat basis. “We sell per-seat to attract the largest demographic – people who aren’t currently private fliers,” he explains. Other flights are sold on a whole-plane basis and scheduled in negotiation with a single customer each.

The pricing for a whole plane is $895 per hour, but fees, taxes, wait times and dead-heads are extra. By contrast, a per-seat roundtrip to the islands costs about $500 from Boston and $900 from New York (Teterboro), fees and taxes included. In the wintertime, Linear’s most frequent run is between Teterboro, NJ, and Hanscom, MA (near Bedford). It also puts one Caravan in San Juan to ferry people around the Caribbean.

“We believe the primary model with the Eclipse jets will be whole-plane business day-trips,” says Herp. “The per-seat model and multi-day leisure travel, while effective at attracting initial customers, will grow more slowly since efficiencies are dependent on the network scaling. As the network scales, we’ll get more efficiencies: We’ll take someone to Montreal and someone else will want to come back,” says Herp – though the broader the geography, the harder it will be to match capacity and demand. Nonetheless, the company is averaging about 900 hours per plane per year with its Caravans, says Herp, and plans to do the same with its Eclipses. That compares with DayJet’s stated goal of 2000 hours per plane per year.

LINEAR AIR INFO
Headquarters: Lexington, MA
Founded: 2004
Employees: 30
Funding: $3.5 million equity from angels and $3.5 million aircraft debt; currently raising $24 million in debt/equity
Aircraft used: 4 Caravans; 30 Eclipses on order
Seats/pilots: 8 seats/2 pilots in Caravans; 4 seats or 3 + lav/ 2 pilots in the Eclipse
Operating model: per-plane, on-demand
Aircraft ownership: 3 owned, 1 leased
Service start: August 2004
URL: www.linearair.com
It figures. While both DayJet CEO Ed Iacobucci and Herp come from high-tech, Iacobucci’s background is operating systems and optimization, while Herp’s is marketing. Linear’s focus is customer acquisition through direct (paper) mail and online advertising; once a customer opts in, Linear communicates with him by e-mail. And then, says Herp, “We focus on delivering high customer satisfaction and repeat purchases.” When Linear gets its Eclipses, it will have customers waiting. By contrast, DayJet has been assembling an operation and won’t really start going after customers until it has its planes.

**DayJet: “It’s about time!”**

“Our consciousness of location is warped by the locations of the major airports,” says DayJet founder and CEO Ed Iacobucci. “I can do a day trip to Minneapolis but I can’t go to Gainesville [from Boca Raton] without staying overnight. When I announced that DayJet will let you get from Tallahassee to Gainesville without going through Atlanta I got a standing ovation. . .and a big smile from the governor [Jeb Bush].”

That’s the premise of DayJet, which is more focused on “industrial” business trips than on jaunts to Nantucket or private-jet luxury. Its prototypical customer is an industrial-parts salesman or a regional manager who will be able to make two sales calls or plant visits a day and get home for dinner, where before he would have had to drive or fly through a hub and stay overnight to get the same tasks done. DayJet is the most “pure-play” of the air-taxi operators, by some lights, though its very comprehensiveness means that it will offer flights only from its own inventory and locations and is not as flexible as many of the other players. However, it also will not have to rely on partners who might be less dedicated to making its customers happy long-term. There will be no owners who may decide to take their jet out of service to go to Aspen for a niece’s surprise birthday party.

**An operating system for airplane resources**

Like its VLJ-based competitors, the DayJet model will be constrained by supply, but it will know exactly what supply it has and be able to control it tightly. The company has a team of five mathematician/scientists and 12 software engineers, and budding relationships with universities. They have built software that can do in 5 seconds using an array of mesh computers what most airlines currently take hours
to do on mainframes. That gives DayJet the ability not just to create on-demand schedules, but to adjust them in real time.

Its optimization techniques continue past the point of departure; it can adjust in near-real time to weather delays, events affecting each of its aircraft and so on. Yet, as many people have discovered, optimization can go too far. If you have figured out the very best way to use your aircraft, chances are that that schedule is brittle: If anything goes wrong, you won’t be able to recover. So DayJet, for example, sets aside approximately 15 percent of its aircraft and uses them as spares (during which time it also performs major engine overhauls as opposed to daily overnight maintenance), allowing it to be more reliable and optimized long-term – or at least that’s what the model predicts.

The factors in the model include D&O (destination-and-origin) pairs and alternate routes involving a maximum of one stop (no change of plane) along the way, pricing, customer-specified time windows (the tighter the window the higher the price), availability of pilots and planes, and many other factors. It’s noteworthy that Iacobucci’s first start-up (after he left IBM in 1988) was Citrix, an operating system company. An operating system, of course, is nothing other than a tool for allocating and managing computer resources.

“The fundamental strength of this technology is that it genuinely will allow us to create flight plans for each customer on the same planes. We simply couldn’t have done that five years ago,” he says. That’s not just a customer benefit; it also allows DayJet to adhere to the FAA’s rule against pre-scheduled service. In fact, he adds, “It would not be in our interest to publish schedules because we can improve our yield by exploring more options.” He estimates that DayJet flights will average a little more than two (out of three possible) passengers per flight.

Competitors downplay the significance of DayJet’s technology; the general comment seems to be, “Well, if it works for Ed, we’ll do it too.” (And they ask: What happens when Juan and Alice are in the plane, but the third, unrelated passenger is late? DayJet answers: You leave without him, or no one will ever show up on time again. It’s that kind of discipline that will lead to success.)

The bulk of DayJet’s employees, especially pilots and maintenance staff, will work from two DayBases, or service facilities, one each (to start) in north and south Florida. While they are not announced yet, one is likely to be in Gainesville, where Eclipse will operate a 60,000-square-foot maintenance facility. (see page 41.) DayJet
will also have “DayPorts” at each of its five destinations, where it will have the air-taxi equivalent of gate agents to give the company a tangible presence on the ground.

In summary, DayJet will own its own supply, so it will have to optimize its use carefully. Of all the players in the market, DayJet is by far the most capital-intensive and risky. But if it succeeds, the rewards will be commensurate.

Come this winter, DayJet will start operations with prices and other parameters set based upon years of data not just about flights, but also about car traffic patterns and demographics for each of its initial markets, all within 350 miles of one another in south Florida. For example, the company is projecting that it will pick up 1 to 1.5 percent of regional business trips (100 to 500 miles) within its market by 2008. Within its projected seven-state Southeast region, that’s 500,000 to 750,000 trips a year out of 52 million, of which 82 percent are currently by car. Over the first few months of operation, no doubt, DayJet will change many of its assumptions in the face of actual data – but the system is designed to be flexible.

**Pogo: Learning by watching**

Aside from DayJet, Pogo is the most visible of the air-taxi startups, but it is holding back until its aircraft plans are finalized. “We’re watching DayJet closely and we applaud all they are doing,” says co-founder and president Cameron Burr, “but we have no need to be out in front of them.”

The company was conceived back on May 12, 2001, when Burr (then with Burr Group, a private equity firm with investments in aviation) sat with Vern Raburn of Eclipse at breakfast at the Conquistadores del Cielo spring meeting in Hawaii. (Conquistadores is an association of aircraft executives formed in 1937.) “Breakfast turned into lunch,” says Burr, “and we were all set to go with an $837,000 plane [for launch] two years ago.”

Of course, things turned out differently, and now the company is taking its time, waiting for the next generation of very light jets – which of course may not quite deliver on their initial specs either. By 2008, says Burr, Honda will either will or will not offer a new business jet, and the Embraer Phenom and Linden Blue’s Spectrum will be available.

The company got close to ordering Adam A700s, but now Burr seems more excited by the Spectrum, a composite-based jet slated to weigh about as much as the Eclipse
(3700 pounds empty) but with a full lavatory and space for five passengers and their luggage. The only problem: It won’t be delivered until 2008 at the earliest, and it will likely cost between $3.5 and $4 million – about half the price of a Cessna Citation Encore+, two-thirds the price of a new Cessna Citation CJ2 (about the same size), and more than twice the price of an Eclipse.

The Pogo model will be to focus relentlessly on operating cost instead of on acquisition cost. Alone among the known air-taxi start-ups so far, Pogo has a CEO from the commercial airline business: chairman and CEO Robert Crandall, who joined Pogo two years ago after a long and visible career as CEO of American Airlines (until 1998). His mission is to get extremely high utilization out of whatever aircraft the company uses – which is one reason for it to wait cautiously for a plane with a higher passenger-to-weight ratio. Crandall is famous for his focus on details, notes Burr: “He thinks like a customer – one who wants to save money.”

The company has only five people currently, says Burr, and there’s enough to keep them busy. They have identified Westover Air Reserve Base, in Chicopee, MA (near Springfield), as corporate headquarters and for a maintenance base. Westover is a joint-use military field with plenty of room for an operation such as Pogo’s. There’s a 12,000-foot runway, lots of hangar space, and about 200 reservists in the area who would probably jump at jobs as pilots or mechanics, as well as grads from local colleges including Amherst and Hampshire.

**Way To Go: Private jet travel for the rest of us**

We saw a fairly typical example of the market opportunity for air taxis at the recent Dialog meeting in Lake Tahoe. About 18 people (out of 60-odd) came up from San Francisco in a shared bus, which turned out to be somewhat cramped (to put it politely). On the way home, two parties decided to book flights and offered to share the extra seats with others – using the simple mechanism of grabbing the microphone during dinner. Two charter carriers benefited, as did about ten passengers. (The bus company, of course, still took the trip back, with an emptier bus, so those passengers benefited too!) The question is, how can we use the Internet to perform a function equivalent to that of the mic at dinner? And note, as one observer points out: The people at the mic “likely just engaged in illegal ‘holding out’ [of a public offer/schedule]. This is a huge area that all would-be air-taxi providers must know
very well. The DOT and FAA have a lot to say in this area and the Internet [or other media] cannot be used to publish prices, rates, schedules, availability, etc.”

Way To Go, based in Palo Alto and founded by Andy Cunningham and Rand Siegfried, would be the perfect company to help out, since it will probably be based in Stockton, CA, loosely between the Bay Area and Lake Tahoe. Its initial plans are not to sell by the seat, but rather to address the B-to-B market and sell to businesses that cater to vacationers, meeting-goers and business people traveling between corporate campuses, as well as real-estate agents and destination resorts, including the casino-rich Nevada side of Lake Tahoe. Over time, as the market expands and consumers become familiar with it, Way To Go plans to market to consumers directly. In our case, it could have made a good sale by giving the Squaw Valley PlumpJack Inn some brochures to hand out to us — or better yet, a link from the hotel’s website.

Way To Go plans to price by “zone,” and to offer on-demand service with a discount for advanced booking. It will serve all airports on the West Coast, but focus (of course) on the smaller, harder-to-reach ones.

The company will use Eclipse 500 jets and plans to start operations in early 2007. It reckons its pricing as “reasonable,” the counterpart of a Carey limo. “We’re focusing on the convenience,” says Cunningham. “If you really want to go cheap, driving is the best solution, but then you pay in comfort and time.”

CEO Andy Cunningham is well-known in Silicon Valley as founder and CEO of Cunningham Communication, a high-tech PR firm (with clients including Adobe, AMD, Cisco, IBM, Motorola, Oracle, Xerox). Before founding her own PR and communication strategy firms, Cunningham worked at Regis McKenna for clients including Apple, for whom she helped launch the Macintosh — and, she says, “lived to tell about it.” She knows from long experience, she adds, that “branding is key.”

Way To Go’s VP of flight ops Rand Siegfried is a former toy designer for Lewis Galoob (now part of Hasbro) with a degree in mechanical and aeronautical engineering from Cornell. He also happens to be an accomplished pilot and flight instructor with 5000 hours of flight time in various aircraft including the Beech 18, T6, Ford TriMotor, T38, Boeing Stearman, Douglass DC3, Pitts Special and numer-

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WAY TO GO INFO

| Headquarters: Palo Alto, CA |
| Founded: May 2005 |
| Employees: 3 |
| Funding: Seed funding from founders; currently seeking investment |
| Aircraft used: Eclipse; initial target of 30 |
| Seats/pilots: 4 seats/2 pilots |
| Operating model: per-plane, on-demand zone-based pricing with a discount for advanced booking |
| Aircraft ownership: leasing arrangement from a related company |
| Areas/airports served: West coast |
| Service start: 2007 |
| URL: www.waytogoair.com (coming soon) |
uous sail planes. He is married to Cunningham and enjoys taking her and the kids up in the air. He flies parabolas (for brief periods of weightlessness) on occasion in his Beech 18, says Cunningham, “and the kids float around in the back. They love it!”

OneSky: One-stop airshop

OneSky is not an air-taxi operator, but it expects to have an active business in helping air-taxi operators fill their planes. It was founded in 2003 by Greg Johnson, a veteran of general aviation with seven years in operations at FedEx. Its model is to aggregate demand for a set of partner charter operators – or rather, to sell supply for them. It uses internal vetting processes in conjunction with the services of the Aviation Research Group (ARG/US) to assess its partners, who collectively operate 1500 aircraft. They include large national aircraft management companies such as TAG Aviation and smaller regional companies such as Executive Connection based in St. Petersburg, FL.

OneSky uses patent-pending pricing algorithms, says Johnson, so that it can accurately predict demand and take inventory risk. And in theory at least, earn a higher return for taking that risk. “We can take the risk and underprice the competition by understanding the market,” says Johnson.

The company has not just experience, but three years of data based on day of week and seasons and holidays, says chairman Trey Urbahn, who joined in 2005 from his previous roles as chairman of Farechase (sold to Yahoo!) and a co-founder of Priceline. He brings a great deal of expertise in pricing and optimization. Right now, he says, “You can go to our website and purchase a flight at little more than half the roundtrip price. We price it on the assumption that we know how to fill the other leg – including a little positioning flight.” That is, the “return” leg of the trip might be from a different but nearby airport. Currently, says Urbahn, that works out to about 60 to 70 percent of the roundtrip price. . .yet it still makes money for OneSky.

OneSky is not alone in the market, he notes, but its competition isn’t reliable. “They haven’t done the work to figure out the odds and what risk they should take. They are filling existing empty legs…” And sometimes they are taking no risk – or rather, offloading their risk onto their customers – because they will simply renege on a deal...
if they can’t fill the plane coming back or find an empty leg. OneSky has built a reputation for reliability and cannot afford to lose it for short-term gains.

On the other hand, he notes, for many charter operators return “dead-head” legs are just an offset to costs, and aren’t managed all that carefully. OneSky hopes to bring analysis and pricing discipline to the market, and to make money pricing right while the competition leaves money on the table or loses business by overpricing.

Of course, competitors willing to lose money aren’t the best kind to have, so OneSky plans to build a brand and promote itself as the reliable option that is consistently able to offer the flights its customers request, as opposed to a best-efforts, “we’ll e-mail you our hot offers of the week” approach.

OneSky is excited about the imminent introduction of the very light jet to air-taxi service. “With a fully developed demand-generation and pricing system and the number-one ranked air-charter website, OneSky is ready to integrate VLJ’s into its suite of private air transportation options,” says Johnson.

“We get flight requests every day that would fit nicely into the emerging air-taxi models,” says Johnson. “Up and down the California coast or over to Las Vegas, New York City to Nantucket and the Hamptons, and trips within Florida and Texas are some examples. We typically use turboprops for those missions today but we expect VLJ’s to supplement and eventually replace turboprops on those types of trips.”

Several of the public and not-so-public ventures in the VLJ air-taxi space have approached OneSky about working together, he adds. The company expects to have relationships both with larger fleet operations and with existing charter companies that add VLJ’s to their contingents of managed aircraft.

**Corporate Clipper: The customer’s advocate**

Taking a complementary approach is Gavin Stener, one of the early employees at Vitria Technology, and now founder and CEO of Corporate Clipper. He thinks the big opportunity is in aggregating demand from corporate travel departments and presenting it to the entire spectrum of travel suppliers, ranging from commercial airlines to unscheduled aircraft operators, whether charters, air taxis or even fractionals (for clients who have shares). Unlike the OneSky model it includes commercial services, and Corporate Clipper works as the customer’s agent. The company offers a
service, including client-side software for travel management and procurement, to corporate travel departments and to the agencies that serve them.

Corporate Clipper believes it is vital to be embedded in the point-of-sale processes and T&E decision-making of corporations. “You have to work with and not against the channel and corporate travel functions. If anyone in general aviation ‘release 2.0’ thinks they can ignore the existing managed-travel and agency community that supplies 70 percent of the business-traveler seats today, they are refusing to see the elephant in the room,” says Stener. He adds, “The last 12 months [of beta operations with a small group of clients] helped us a lot with understanding the culture and mindset of the corporate travel buyer and the agent. The airlines control the agency domain and they will not give the new VLJ players an easy run. Every seat will be hard-won for the air-taxi community. Experience has taught us that getting inside the corporate and agency ‘hen house’ with some elegant technology and then allowing our [travel supplier] partners to see real-time O&D demand for the American road-warrior is a key first step.”

The actual user base Corporate Clipper is addressing is the high-level road warrior, but below the top echelon. This traveler doesn’t have easy access to the corporate jet and he books his travel through the corporate travel department or designated agency, but when he needs to get somewhere fast to make a sale or serve a client, the corporation wants to get him there regardless of the cost. In a large corporation, there are usually a few hundred such people. Mostly they use commercial service, but Corporate Clipper is basing its model (for the next couple of years) on just 11,000 active individuals (mostly within corporations) taking about 5000 air-taxi trips per month.

From the charter or air-taxi suppliers’ point of view, these are attractive customers precisely because they book at the last moment, soaking up capacity that would otherwise go unused. Any charter operator registered as a Corporate Clipper partner (which is free but they must meet certain criteria) can look at the demand and decide whether to fill it, at pre-negotiated rates set with Corporate Clipper. That enables the supplier not to compromise pricing for the rest of its offering. Says Stener, “We can take advantage of the market’s peculiar factors, which at least for now make [flights on] leased or chartered aircraft artificially cheap. It has many parallels to the early days of Hotels.com [and Priceline, where the user could set the
price but had to commit without knowing the supplier] in the mid-1990s.” And indeed, Corporate Clipper has two former Hotels.com executives as advisors.

As Corporate Clipper becomes better at predicting its customers’ demand and behavior, it will become smarter at advising operators on the placement of assets for the benefit of both parties – or at least that’s the idea. Corporate Clipper hopes to negotiate good prices for its clients by providing a steady source of profitable business to the suppliers.

Overall the company will make its revenues based on customer membership fees, supplier advertising, technology licensing of demand-management software to air-service suppliers and ancillary services. The company will benefit to the extent that it creates a new class of business traveler and can make visible and deliver a new source of demand to Part 135 suppliers, rather than slice into the existing market for high-net-worth individuals already traveling on private planes.

In the end, Stener’s mission is to represent the demand rather than the supply: “Until we focus on demand at the edge of the network in near-real time, rather than being driven by supply constraints [i.e. ownership of aircraft and management of pilots], as an industry we’ll just be an extension of the 60-year history of commercial airlines,” he says. He argues that just as Cisco and Hewlett-Packard outsource manufacturing to Flextronics so that they can be truly responsive to customer demand, so will Corporate Clipper outsource actual carriage of passengers to operators.

**SlipStream Air: The industry’s arms merchant**

Application service provider SlipStream Air aims to be the Salesforce.com-style supply-chain management platform for the private air travel industry, though focused on operations and optimization as well as sales. Founded in 2004, the company is still at the beta stage – just like many of its customers. Those customers currently include 10 charter operators and 8 air-taxi start-ups. The foundation of Slipstream’s service is a fleet-management platform. For back-end optimization, SlipStream is working with experts in operations research at MIT, Virginia Tech and the University of Maryland, College Park.

It comes in two versions: Slipstream Air: Professional gives charter operators more operational control and fine-grained optimization than most of them have today. It deals with interacting
constraints including aircraft positioning, pilot availability (constrained by flight-hour regulations) and maintenance – as well as customer demand, of course.

SlipStream Air: Enterprise is the air-taxi offering. It includes the air-taxi operator’s (private-labeled) website face to the ultimate (passenger) customers. The Enterprise suite will have more of a front-end, customer-service focus, as well as stronger optimization technology for fleet management and operations, including scheduling (but not per-seat).

“Charter sales are fairly personal, at least for now,” says founder and CEO Steven Fisher. “But the air taxis are aiming for volume [for better optimization as well as for sheer revenue growth], so they need something more like an Orbitz or Travelocity interface – except that there are no flights to pick from; you specify your own requirements.” Accordingly, many air-taxi companies may look to a Web presence to help them develop a competitive edge (especially as competition proliferates within a single region), which may make them loath to depend on a third party such as SlipStream for their Web presence. Fisher hopes to provide enough customization tools so that each air-taxi operator’s site will look unique.

The Enterprise reservation system will also include a trademarked Total Cost module which will encourage the user to enter in the cost of time and alternative transportation choices, so that he can see the cost justification for an air taxi when you factor in not just air fares from the legacy hub-and-spoke airline system but also driving time, security-line time, change-of-plane time and all the other costs of travel as it is now. The user can also add hotel costs if the alternative means involves an overnight stay. Of course it all depends on how each user values his own time, but simply going through the thought exercise should be illuminating for many travelers. (However, unlike Corporate Clipper’s tool, this module does not include booking functions for anything other than the air-taxi company offering it.)

The other important function of the SlipStream Air platform overall will be managing partner relationships. Generally, charter operators manage a specific fleet over which they have control, even though the planes are typically owned by individuals. When they can’t fill a request with their own fleet, they often refer customers to other carriers, taking a cut of the action. In addition, some air-taxi companies will outsource all their operations, and will need tools to manage the intricacies of work-
ing with partners, whether occasionally or regularly. Of course, some of those partners may end up being other air-taxi companies.

SlipStream right now works with each of its customers individually, but at some point its customers may be working with one another through SlipStream Air. “There’s a land grab going on right now,” says Fisher, who spent 16 years in high-tech as an engineer, marketer and entrepreneur. “Once there’s enough aircraft, there will be the affiliate model and a lot of M&A. By 2015, I hope there will be a combination of hubs and spokes integrated with a mesh network of air taxis.”

Financing: Your Money or Mine?

How are all these air-taxi ventures going to get funded? That’s one of the market’s biggest challenges. Overall, it’s far more capital-intensive – and unproven – than most venture capitalists are used to. Yes, you can fund the aircraft with debt, but that isn’t easy either. Lenders don’t like to lend if they don’t see a viable – well-funded – start-up planning to use the planes, and investors don’t want to apply their scarce equity funds to financing aircraft. So any air-taxi start-up has to pull off an elegant, two-part financing maneuver if it wants even the chance to be successful.

As one potential investor notes: The investors who made the most money in Federal Express came in on the third round, after the valuation had been depressed by start-up costs. Likewise, even believers want to be in the third round, but somebody still has to come up with the first two!

So far, most of the industry’s funding has come from angels, the entrepreneurs’ own accumulated wealth, and hedge funds. What’s needed, notes Paul Masson of PATA (Page 39), is not venture capital but champion capital. We have a few venture capitalists attending our Flight School: Air workshop, but there’s still no real VC market for air taxis. We hope to see that change soon. Meanwhile, there is at least some market for financing aircraft, though it is still a niche.

Aircraft financing

Stacey Wilson of Structured Finance International has a unique specialty – financing commercial airline fleets. Now he faces a new challenge: financing DayJet’s new fleet
of Eclipses. It’s a team effort, he says: “We’re working with Eclipse, Pratt & Whitney, state and federal governments, and other stakeholders.”

As he explains, the challenge of financing commercial aircraft is that asset liquidity varies greatly from one aircraft to another, with Boeing 737s and the Airbus 320 Series offering the greatest liquidity. Those familiar narrowbody aircraft comprise the “fat front” of commercial aircraft, numerous and easily tradable. But private air services, regional airlines and especially air taxis, use the long tail of aircraft – a diverse set of smaller aircraft, many of them numbering only in the hundreds.

“Planes that appeal to individuals are primarily valued on their basic worth (performance, quality, etc.), but on the commercial aviation side, it also has to do with market factors,” says Wilson. The actual “value” of a commercial aircraft is largely overshadowed by factors which have little to do with the aircraft itself, starting with the number of such aircraft in the market and the number of potential buyers. The challenge for air-taxi fleet financing is that it’s a new market with few assets and few potential buyers – to say nothing of no track record.

Other factors are even more external, such as government and manufacturer support and pilot contracts.

Wilson’s approach is to help appraisers and lenders understand the value of the asset – the Eclipse 500, for example – both as a business or general aviation jet, worth some fraction of its expected resale value, and as a commercial aircraft, worth some multiple of the projected earnings. The Eclipse 500s (and the Adams and Cessnas and Phenoms, for that matter) are really both, which represents an added element of asset liquidity – a boon to “financeability” for operators, manufacturers and investors. It’s dealing with all those intersecting factors, and presenting them in a credible way to investors, that is Wilson’s forte.

He continues, “We’ve represented both startup airlines and new manufacturers before. In both cases, there needs to be at least a minimal amount of equity capitalization on hand before aircraft investors roll up their sleeves to tailor financing solutions. This is important from both a quantitative (risk mitigation) perspective, and a qualitative perspective: The lenders want to know a borrower or lessee is committed, and there is no better way to show this than having skin in the game.”

The financing, when it is raised, is aggregated within a “structured financing” and comes not just from banks and financial institutions, but also from lessors, govern-
ments, engine manufacturers and anyone else who might have an interest in the success of a small airline. Adds Wilson: “Aircraft production represents a large portion of GDP and employs an enormous number of people across the world. This basic fact is central to the discipline of commercial aircraft finance.”

Wilson recently formed his own firm, Structured Finance International, with four partners, who represented the core of the Aerospace Structured Finance group at CIT Group and prior to that worked together within the investment banking division of Newcourt Credit Group-Newcourt Capital. Over the past nine years, the team has funded fleets comprising more than 530 aircraft for a variety of regional airlines and manufacturers including SkyWest, Horizon, Mesa, TSA, ACA, Chautauqua, Bombardier and Embraer. These are primarily non (credit)–rated regional airlines flying (relatively) illiquid assets.

“Financing a Boeing 737 or an Airbus 320 for an established, creditworthy major airline is fairly straightforward, but our business consists of turning over every rock we can find to build layers of support and efficient economics into each financing. There are many similarities between the relatively young regional-jet markets and the emerging VLJ on-demand market. We will try to apply the lessons learned from our RJ experiences, but at the same time we want to incorporate the unique dynamics of this industry. The challenge is to do this as economically as possible when it comes to the fleet.”

A Tale of Three Planemakers

There is a variety of planes that can be used in air-taxi operations, ranging from the already-in-service Cessna Caravan and Cirrus SR22 propeller planes, to the imagination-catching Eclipse 500 and Adam A700 very light jets, due to be certified this June and this year-end, respectively. Also promised by year-end is the Citation Cessna Mustang very light jet ($2.5 million, 240 orders). Farther off in the pipeline are the Embraer Phenom, the Linden Blue Spectrum and the rumored Honda business jet. Each of them has its own advantages and trade-offs. We profile three of the independents here, focusing more on the companies and their leaders than on their planes, whose merits have been widely discussed. To make subtle distinctions blunt, Klapmeier of Cirrus Design is focused on customers, Vern Raburn of Eclipse Aviation is focused on building a new market, and Rick Adam of Adam Aircraft is focused on the plane itself.
**Cirrus Design: Real planes for real people**

Cirrus Design may not make very light jets, but it sees the air-taxi world as considerably broader than just VLJs. In fact, it’s key for the SR22, a single-engine piston propeller plane. As co-founder (with his brother Dale) and CEO Alan Klapmeier says, until the SR 22, planes were either built for “plane nuts” and not very comfortable, or built for rich people and not affordable to anyone else. He sees the air-taxi market as an outgrowth of comfortable, affordable planes such as the SR 22, and also sheer demographics – people with more money than time, and with a desire to control their own schedules.

He has put money on this notion. Cirrus is a minority investor in SATSair, an air-taxi operator. Based in Greenville, SC, SATSair has about 15 Cirrus planes and is running a thriving but not-yet-profitable regional air-taxi service. (The name is a play on NASA’s SATS project, but the website calls it “Smart Air Travel Solutions.”) The company fits neatly into Paul Masson’s definition of a rural operator that knows its market and serves it effectively, though it is growing rapidly and may become a regional player.

Says Klapmeier, “We’re going to learn a lot about real costs, real customers, from it. Not everyone [in the company] agreed, but I was a strong advocate for ‘just go start it!’ We’ll never know enough before we start. We chose to invest in it because we believe that there’s strong demand out there for this kind of transportation. The hardest obstacle is to get funding. So if we could get SATSair to prove that it works, that would ease the way for others, whether they’re our customers or someone else’s.”

Cirrus itself has a long-term mission of getting non-fliers into the air since its founding in 1979. It focuses on safety as much as cost. Since 1994, each Cirrus has had a parachute designed to open when something goes wrong – and it has done so seven times and saved 15 lives over the course of about a million flights, says Klapmeier.

“Safety is a barrier to getting many people into small planes,” says Klapmeier, “but the parachute is an important factor, along with the statistics.”

Cirrus also focuses on comfort – which is key to getting people to come back. People in the aviation business, says Klapmeier, “make a mistake when we use ourselves as
examples. [Normal] people have different concerns, about safety and about comfort. We need to build a market much larger than the 600,000-odd active pilots in the US.”

Of course, not all pilots welcome amateurs into “their” skies. The current SR series, first introduced in 1994, was criticized for being too “auto-like,” compromising for comfort while purported real pilots wanted performance. But Cirrus has sold about 2700 of the aircraft. Its users may not be “real” pilots, but evidently these people want to fly, for both business reasons and personal reasons. He adds, “No one is going to be satisfied with Internet golf. Our potential market should be compared to automobile travel...and beyond that, to the trips people want to take but that simply don’t happen. In the past, it was too difficult [and expensive] to learn to fly. What was unique about Cirrus was our proposition that airplanes should be worth the trouble. A lot of people who used to buy airplanes would put up with anything to fly.”

Now, says Klapmeier, he’s concerned about making the sky more accessible to a dramatically expanding market of fliers, both as their own pilots and as air-taxi passengers. He sees a big need not just for scalable airspace management, but also for more airports and more runways: “The challenge isn’t fitting jelly beans into a jar; it’s getting our hands into and out of the jar.” And he’s confident that pilots can take care of themselves. As he points out, “We take cars and run them at each other at 60 miles per hour and avert disaster every day with a little yellow line. All we need is two airplanes to properly position themselves vis-à-vis each other and stay out of the same space.”

He’s convinced that peer-to-peer communication, navigation and surveillance will prevail, he says. “It’s very likely, because in the long run I believe in economic forces...though delivering economic forces through a political system is a very slow process.”

**Eclipse Aviation: Built to scale**
The Eclipse 500 is the poster craft of the air-taxi/very-light-jet world. The plane, originally priced at $837,500 (in June 2000 dollars) in 2004, now sells for about $1.5 million (or $1.295 million in June 2000 dollars), and should be certified by the FAA this June. The company made good on its commitments, notes founder and CEO Vern Raburn with pride, and has sold more than 2000 Eclipse 500s for around $1 million each in June 2000 dollars. (He’d like to get the price down again on the basis of volume economies.) Whatever, that’s pretty good in the world of large projects. In the meantime, the appeal of a low-cost aircraft – both to buy and to operate – has only gone up.
Eclipse currently has pre-paid orders for almost 2500 of the jets, and plans to build 82 of them by year-end. Next year, in 2007, it expects to build 600. After that, says Raburn, it has current capacity to go to 1000 a year, with a vendor base that could also support that volume. Eclipse is volume-driven, from its carefully designed aluminum body to a $6-million painting system that allows it to paint a plane in two days instead of a week.

Raburn began his career in IT, working with Bill Gates at Microsoft and Mitch Kapor at Lotus and eventually becoming CEO of Symantec in the late 1980s to the early 1990s. He also worked for Microsoft co-founder Paul Allen at Vulcan Ventures for much of the '90s. In 1998, he founded Eclipse Aviation to go back to his first love, aviation. (His father Lou is a former engineer at Douglas.)

The Eclipse 500 was the first aircraft in the very light jet category and arguably is the most revolutionary version of the very light jet, with a range of 1200 nautical miles and extremely low operating costs. Early on, says Raburn, about 70 percent of his production will be for individual owners (the ones who ordered the plane back when it was still a dream, in 2001). Within a year or two, assuming the air-taxi market takes off, he expects it to swing the other way, with 60 percent or more of deliveries going to air-taxi operators.

How cheap could these planes become? Raburn says the physics of building something will keep the price up: “Realistically you could build something like this for $700-800,000, but it would require firm orders and $3 to $4 billion of investment across our supplier base. We don’t fully obey Moore’s Law. We benefit from technology in manufacturing and avionics, but not in the rest.” Specifically, he points out, engines, the single biggest cost of a plane, aren’t going down in price. And “the [regulatory] paperwork cost won’t scale down the way the other things do.”

Raburn spends a lot of time with influencers, whether partners, media or government officials. He has been a vocal proponent of the market and has actively worked to get local support both from the New Mexico state government (which created an unparalleled package of incentives, building leases and repealed the sales tax for aircraft to lure Eclipse from Arizona in 2000), to the Florida state government, which is funding a 60,000-square-foot maintenance and operations facility for the company at the Gainesville airport. Eclipse will pay rent, to be sure, but half of the $11.2-mil-

![ECLIPSE AVIATION INFO](www.eclipseaviation.com)

**Headquarters:** Albuquerque, NM
**Founded:** 1998
**Employees:** 635
**Funding/revenues:** $500 million from angels including Bill Gates and some debt
**URL:** www.eclipseaviation.com

**The plane:**
**Name:** Eclipse 500
**Weight:** 5,640 lbs
**Range (with full weight capacity):** 1200 nautical miles
**Operating cost/hour:** less than $340
**Is there a lav? optional
**Pilots/passengers:** 1/4 or 5 (3 or 4 in air-taxi mode with 2 pilots)
**Price:** ~$1.5 million
**Certification date:** June 2006 (expected)
lion cost of the building was put up by the Florida Department of Transportation, says airport manager Rick Crider.

As the company’s chief salesman and spokesman, Raburn recently hired a complementary COO with deep strengths in operations: Peg Billson, previously VP and general manager of Honeywell International Inc.’s Aircraft Frame Systems business, a $2-billion, 3000-employee supplier of air condition, electric power and auxiliary power units to the aerospace industry.

Adam Aircraft: Born to fly
While Raburn is building a company with vision and scale, CEO and founder Rick Adam of Adam Aircraft is more focused on the plane itself. The company’s first model is the Adam A500, a twin-engine propeller plane designed by Adam and Burt Rutan with a signature split tail. The body is made of ultra-light carbon fiber, and is built strip by strip (remember papier maché from grade school?) by workers who lay down sheets of adhesive-impregnated fiber inside molds. Compared to the Eclipse 500, the production process is more labor-intensive...but the design is more modular. The A500 has been flying since 2002 and was certified May 2005. The A700, due for certification by the end of this year, is a slightly longer, twin-jet-powered version of the same design. It will cost about $2.25 million, says Adam. The key to the A series is modularity; the basic design can support a variety of engine, seat, cockpit and other configurations.

Adam’s announced customers include Pogo, with a cancelable order for 50 planes (though Pogo disputes that assertion; see page 17; airplane orders are typically cancelable until a plane gets certified). Adam’s plan is to ramp up to about 400 planes per year, with an expected mix of 80 jets to 20 propeller planes. He expects that about half of them will be used as air taxis, while half will go to individual owners.

Adam notes that Europe is an even more welcoming market for air taxis and shared services than the US. “The whole buzz of the [recent] air show in Geneva was VLJs and air taxis. Europe has 15 percent of the general aviations, but it looks to be about 30 percent of very light jets. [Unlike in the US,] 80 percent of the trips are within a thousand miles.”
And he notes, “Culturally, Europeans are more likely to get into shared transportation. Wealthy people tend to manifest their wealth differently, and they aren’t as likely to want to own their own jet. The regulatory environment is a little harder, but the fractional guys have worked a lot of that out.”

As for the Adam/Eclipse rivalry, he comments: “Vern [Raburn] is a better visionary, but I can see the vision well enough to know we should be in this business. Vern is a breakthrough person. I’m incremental operating guy.”

He explains his previous entrepreneurial venture, New Era of Networks (NEON, sold to Sybase in 2001) as a similarly “incremental” idea: “The problem we solved at NEON – integrating multiple incompatible systems – was one I had seen and solved incrementally multiple times over eight years.” NEON was simply an independent company dedicated to productizing and selling that solution. The other thing he got out of that experience was a deep appreciation for scalability and modularity. Eclipse is focused on mass production (i.e. scalability of manufacture); Adam has a tendency to modularity, i.e. scalability of design and customization.

In short, Adam is more likely to be on the production floor than out with customers or in Washington. In 2004, he hired as his number-two and president Joe Walker, a veteran salesman: Walker was previously senior VP of worldwide sales for Gulfstream Aerospace. Before Gulfstream, Walker worked at Cessna Aircraft Company from 1975 to 1994 in sales, tech support, marketing and strategy.

**Air Control to Modern Tech**

Naverus and Avtech are among the many technology start-ups who will contribute to a broad, peer-to-peer system of air-traffic management. Others include Garmin and Avidyne (makers of electronic flight decks), as well as many divisions of larger vendors such as Lockheed and Boeing.

**Naverus: Stored procedures, repeatable results**

“When you look out the window of a plane,” says CTO Steve Fulton of Naverus, “the other planes are specks. The only thing that’s crowded is the controllers’ screens.” He argues that the controllers have too much work because the planes don’t have precise enough paths and are not given enough “credit” for highly accurate positioning sys-
tems like GPS. Developing such paths – or airport- and aircraft-specific procedures – is Naverus’s primary business. Founded by two former Alaska Airlines captains, it sells mostly in emerging markets where air-traffic management technology is leapfrogging what’s in use in the US – that is, India and China. (Notes CEO Dan Gerrity: “After the introduction of the cell phone, India went straight to wireless and skipped the step of pulling copper wire everywhere. The same thing is happening with navigational infrastructure: They are going straight to the right answer.”)

The overall concept is called “required navigation performance,” or RNP, and it allows aircraft to operate more safely and in much closer proximity than before. RNP procedures (flight paths) allow a controller to focus on the exceptions, while most aircraft operate routinely, going in and out of airports (or other dense or controlled spaces) according to routes precisely defined both laterally and vertically. They also permit far tighter spacing, because the aircraft are guaranteed to remain within their precise corridor (and are monitored to make sure they do so). The system uses GPS, rather than ground systems, to determine the position of the aircraft, so it is suitable even for small airports with no landing towers or instruments.

Of course, the system’s real potential is to be used with complementary CNS technologies such as ADS-B (Automatic Dependent Surveillance – Broadcast, the “surveillance” component of CNS; see page 37), which would enable them to be aware of other aircraft as well. In the end, all these systems will need to communicate securely so that surrounding planes and ground control can confirm that each plane is adhering to its procedure. That’s the promise of NGATS (Next-Generation Air Transportation System), the modernized version of the US air-transportation system planned by the Joint Planning and Development Office (see page 38).

Currently, Naverus has about a dozen customers, including Air China Southwest, Qantas, WestJet, Air New Zealand and JetBlue, and has developed about 300 RNP procedures – all for airports outside the US. Its edge is based on technology and systems for designing the RNPs, but it also works with its customers on how to use the RNPs, how to integrate them into other systems and, importantly, how to get approval for them from the appropriate authorities – something it has managed to do in Canada, Australia and China, but not yet in the US.

Currently, US airspace flight procedures (generally far less precise than Naverus’s) are developed by FAA engineers at a facility in Oklahoma, but there’s about a two-

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**NAVERUS INFO**

- Headquarters: Renton, WA
- Founded: 2003
- Employees: 42
- Funding: $8 million from angels
- URL: [www.naverus.com](http://www.naverus.com)
year backlog. Moreover, the FAA procedures are used by controllers in giving instructions to aircraft (each time a plane files, it gets a flight plan from ATC), whereas Naverus’s procedures are loaded into an on-board flight-management computer that communicates with a variety of instruments, sensors and communications/broadcast equipment and eventually will communicate with ATC and other aircraft when those complementary systems are available.

As JPDO consultant Charles Huettner asked in an article in *Journal of ATC*, July-September 2004: “How do we meet the demand for RNP procedures if only a small group of talented people...at the FAA’s Aviation Systems Standards office in Oklahoma City, OK, have to review, approve and flight-test each procedure?” He suggests that the FAA should shift away from the certification of specific procedures and towards the certification of design organizations that make them, such as Naverus, as already happens in Canada. We suspect it is finally likely to happen in the US as well.

**Avtech: Adding in the fourth dimension**

While Naverus is focused on developing flight procedures, Avtech works on the integration of such procedures into the broader air-transport system – “adding the fourth dimension of time as an enabler,” as founder and CEO Lars Lindberg puts it. Founded in 1988, Avtech is a 25-person systems integrator. It works with clients such as Airbus and Boeing, Ericsson, Eurocontrol and various airlines.

In Stockholm and Vienna, it is part of a project (sponsored 50 percent by the EU) among the airports, SAS, Austrian Airlines, and the traffic-management service providers, which in this case are the Swedish and Austrian civil aviation authorities. “We’re tying this together with collaborative decision-making,” says Lindberg, who also still flies about 40 hours a month as a captain for SAS (SK in industry parlance). “The airplane flies using a tightly designed procedure [such as Naverus’s RNPs]. In the old way, when you use radar, you look at an echo on the screen and try to predict where the plane will be; you can only extrapolate from where you are heading for a few minutes out. So instead, we start from the beginning, making the future flight path from the aircraft’s Flight-Management System (FMS) available to ATC.”

The first such flight was conducted on January 19th of this year when SK 007 (between Lulea and Stockholm, both in Sweden) was cleared and flew an optimum path to its touchdown, with only 2-second deviation from the declared plan. On March 16th the system was graduated from experimental status, and since then it
has been used on more than 150 revenue flights – including several flown by Lindberg. He notes: “The procedure is now being used in medium traffic density. We didn’t install any new equipment in these aircraft; it was all done with software modifications to the FMS and the ACARS (industry-standard Aircraft Communication Addressing and Reporting System) datalink.”

Perhaps it’s easiest to understand (at least for us) when he describes it from the point of view of the pilot. At the very beginning of the journey, a pilot files a flight plan, and communicates it using an ACARS datalink to the controllers whose airspace he will be passing through. That’s all standard practice today. Normally, he would be communicating with a variety of controllers on his journey, especially at landing time, when he listens for instructions from the controller – by voice – with his plane call sign.

But instead, Lindberg describes his most recent flight: “Today, as I was somewhere over Belgium about an hour and a half out from Stockholm, I got an ACARS message from Stockholm saying I should follow one of the new optimized approach procedures for a particular runway, and confirming my arrival time [since there was no conflict]. I put that into my FMS, which recalculates my flight procedure and sends a confirmation to Stockholm. So in Stockholm the system says, ‘Good! He’s doing what we want him to do.’ I continue to fly. The FMS continues to calculate the optimum path to the top of the descent path and displays the procedure on my navigation display and monitors that my plane is following it. When I reach that point I make a continuous descent down to the runway using the RNP.”

If the plane deviates in any way, the pilot and the controller are both notified immediately. That’s the first part of the new model: what Lindberg calls the strategic part. Currently, all 20 SAS 737 NGs (for Next Generation) at the Stockholm hub have been modified so that each can fly as close-to-optimum a path as possible, conflict-free, despite the presence of other aircraft, using such defined procedures.

In September, four SAS 737s will be equipped with a new radio from Rockwell Collins and new displays onboard, which will allow the full use of ADS-B onboard. At that point, each aircraft will be able to broadcast its flight path not just point-to-point to the controller, but also to any other aircraft in the area. That provides what Lindberg calls “tactical” support – real-time interaction among all parties. But that’s only near the end: “You don’t want to be broadcasting your entire flight path to everyone along the way from Los Angeles to Stockholm!” he says.
In addition, instead of talking to the controller, the pilot can communicate with the controller machine-to-machine; the controller sees a blip on his screen and a trajectory projecting through time, while the pilot gets text instructions on his display screen. The controller can click on something and it will come up on the pilot’s display. . . . That means a lot for pilots, says Lindberg, who lost some colleagues in a runway accident in Milan: “You won’t get lost in confusion in an active runway, through misunderstandings and language problems.”

Of course, this all sounds so incredibly simple. Indeed it is, except that it must work with utmost reliability. “Getting people to trust this concept is a big part of what we do,” continues Lindberg, “and having the 4DT [four-dimensional with time] system operational so that we can gather data and take gradual steps as we build confidence is crucial. This is nothing that just happened yesterday. We have been involved in this for over ten years and collaborated through the years with NASA, FAA, UPS, etc. In Europe, users and the industry are building the future air-traffic management system together, with government participating only as oversight and providing the funding. The results from Europe are being fed into JPDO, and there is a dialogue ongoing with at least two large US airlines and two airports to start an evaluation.”

As a company, Avtech works with clients such as Airbus and Boeing: “Together with Smiths Aerospace, we convinced Boeing to change its flight management system so that other people could see its data; now we are validating it step by step to make sure that it’s behaving the way it’s supposed to.” Of course, the data is encrypted so that it goes to other known pilots and controllers, but – unlike today’s current ATC broadcasts – not to the public at large or to people sitting in United’s passenger compartment listening in to the captain’s communications.

The Environment: Sense and Scalability

When arguments get too heated, certain words and phrases (such as privatization or outsourcing or abortion) become taboo and get replaced with new code words. That’s often the case in the airline business, which is beset with operational challenges and arguments over who should pay for the air-traffic control system. For example, Bruce Holmes, Director of NASA’s Advanced Planning Office at NASA Langley Research Center and the key man in the vision described here, notes, “You hear the word ‘scalability’ all the time. It’s a code word for a lot of things – decentral-
ization, peer-to-peer, and so on.” That’s because management of the air system needs to be scalable in order for it to grow.

While there are short-term financial issues, the real long-term issue is sheer growth. The current system is incapable of handling the 20,000 planes projected by 2025 unless it can release aircraft from ground-based control and give them more of an ability to manage themselves and communicate with one another.

The need for scalability – the ability to handle two to three times more traffic in the same time period – is most critical not at the secondary airports that will be served by air taxis, but at the hub airports used by the major airlines (although of course there is some overlap, especially around big cities with both hubs and commuter airports). And scalability will be needed at the cruise altitudes in the airspace as well.

Another benefit to air taxis is that this more flexible, lower-cost system requires technologies that will allow precision landings without the ground-based infrastructure. More automated, peer-to-peer systems will allow them to fly into more airports more cheaply. And over time, costs (per unit of flight however it is measured) should go down, regardless of how the infrastructure is paid and charged for.

As Rick Adam of Adam Aircraft, a former partner in charge of IT for Goldman Sachs, puts it: “In technology, we thought a lot about scalability. If you require people to know a lot about each other, you can’t get much to happen. But you can get on the Net and you don’t need to know a lot about the other guys to get a lot done. Highly centralized, government-run systems tend to want a lot of agreement upfront, but industry can figure out a way to keep people safe without a lot of agreement beforehand. For example, five years ago, every pilot used to call the FAA before getting into the plane for a weather report. Now you get into your plane, turn on your electronic flight deck and it downloads a better weather report than you could ever get in the old days.”

Indeed, new technology is coming, and more broadly than just for weather reports. Currently, flight operations above 18,000 feet and involving aircraft weighing more than 12,500 lbs. must be controlled by an air-traffic controller. However, the FAA is now opening up to new technology such as ADS-B (Automatic Dependent Surveillance – Broadcast), a technology that lets an aircraft broadcast not just its location but its intent – gaining or losing altitude, accelerating or decelerating, turning – so that ground-based controllers and other aircraft can see not just its position but its coming trajectory in relation to its own stored flight plan.
This technology has been tested in Alaska under an FAA program called Capstone and by cargo airlines in the Ohio Valley and is now – about two years later than planned by the FAA – about to be tested at a number of other locations, including Gainesville Airport (see box, page 41) in Florida. As Rick Crider of Gainesville Airport says, “It doesn’t have any immediate impact on operations. But over the long run, it’s part of the necessary transformation of the air-traffic management system.”

**Flying off into the wild blue yonder**

The single most important organization behind the transformation of US airspace management is the so-called Joint Planning and Development Office (JPDO), an interagency organization comprising mostly NASA and the FAA, with some participation from the Departments of Defense, Homeland Security and Commerce, and other government agencies. It was created at the direction of Congress in its 2003 reauthorization (and funding) of the FAA in response to a Presidential Commission on the Future of the US Aerospace Industry, led by executive director Charles Huettner. Its mission is to develop and implement a national plan that will modernize the US air transportation system by 2025, under the name of Next-Generation Air Transportation System, or NGATS. This plan incorporates the air-taxi model as one of its basic tenets, among others including self-managed “free flight” in general. This target date is far enough off that we can be creative about the ultimate goals and then work back to figure out what we should be doing now, says Holmes, a key contributor. (Disclosure: Esther Dyson is a member of the Research, Engineering and Development Advisory Committee (REDAC), the independent civilian committee that advises the JPDO, as is Vern Raburn.)

Even before JPDO and NGATS, which have a political and policy agenda, NASA in general and Bruce Holmes in particular had been working on the basic concepts and the enabling technologies, funding a number of R&D projects and working with private industry to make them happen. Many of the technology foundations for the new aircraft were the focus of the Advanced General Aviation Transport Experiments (AGATE) Alliance, a public-private collaboration led by Holmes at NASA that targeted pre-competitive industry standards for everything from avionics to composite materials qualification processes. Based on work that started in the late ‘80s, AGATE ran from late 1993 through 2001.

In 2001, NASA and Holmes launched the Small Aircraft Transportation System (SATS) Project, a consortium of research organizations working with OEM’s (including VLJ manufacturers) focused more on airspace-related technology and
BRUCE HOLMES SPEAKS FOR HIMSELF

SATS - and indeed much of the air-taxi business we now envision today - was the brainchild of Bruce Holmes, a longtime industry pioneer at NASA.

He professes enthusiasm at the current state of affairs: “I’m vastly encouraged, compared to a year or two ago. It looked daunting a year or two ago. There’s a new sense of legitimacy for the idea of personalized air mobility in the form of per-seat fleet operations. The JPDO at least implicitly recognizes on-demand fleet operations – and related use of airports – as a driver towards the Next-Generation Air System, even though they have to walk this fine line between legacy industry interests and emerging industry.

“On the upside, the JPDO-instigated decision by the FAA to move forward with Automatic Dependent Surveillance – Broadcast is the first significant step towards scalability in the architecture of the [US] air-trafic management system. Before ADS-B, you were at the mercy of where there is radar coverage. After ADS-B, you have at least one of the barriers lowered.”

Of course, he acknowledges, there are a couple of challenges: “One is the business models and the other is federal government policy that would allow those models. You want business models that can move with technology, not with government policy. So you need regulatory policy that is sufficiently long-lasting and flexible. Right now, that doesn’t exist.

[Legally,] these functions still require government-owned spectrum, and government standards. In actuality, radios can do this function; cell phones can do it. The technology itself is available; it’s digital and airborne, and distributed. “So if you can get those two gates [of business models and policy] open, the race is on.”

The JPDO’s stated deadline of 2025 for its Next-Generation Air System, he continues, “is just a way to market the crisis and to force action. The rest of the story has to be about what happens now. The ADS-B is an early instantiation of that.”

He reflects on the award of the Collier Trophy to Vern Raburn and the Eclipse in May: “Some people wondered why we gave the award before the plane was certified. When we gave a trophy to Neil [Armstrong for walking] on the moon or to Burt [Rutan] and his bottle rocket, they weren’t certified either. What is better certification than hundreds of orders from a guy like Ed Iacobucci? The skeptics in the old industry are still unswayed and must remain so...but the reality of the airplanes, the experience of the customers, that’s what matters. Customers will say, ‘You can’t take this away from me.’ Airplanes are life-giving instead of life-sapping.”

procedures than on the aircraft themselves. In 2002, says Holmes, “I turned the operation over to a NASA-led project team so that I could work with the DOT, White House, and JPDO on the larger national framework in which SATS would eventually need to fit.”

As the SATS project wound down in mid-2005 with a public demonstration of its achievements at a big fly-in in Danville, VA, different groups of the entities involved emerged to follow up on its advances. They include an airport-focused group in Florida known as the Consortium for Aviation Systems Advancement (CASA), and a separate group of air-taxi operators and OEM’s, originally called FASTER (for Flexible and Safe Transportation from Every Runway). FASTER changed its name to the Personal Air Transportation Alliance (PATA) and is now led by innovation consultant Paul Masson. He describes it as “a forum for intra-industry networking and creating common positions for advocacy to support deployment of expanded air-taxi operations throughout the United States.” Overall, though, the momentum has now moved to the individual companies implementing these visions at their own pace and in a variety of flavors.
**Back to the future**

Key to the long-term vision is a less centralized, more autonomous system in which planes and pilots communicate peer-to-peer and with the ground, and where hierarchical “control” gives way to horizontal “management,” as JPDO advocates. This is a sensitive topic, since some might see it as leading to a loss of controller jobs, but the reality is that attrition on the one hand and growth of the number of aircraft flying on the other mean that no one is likely to lose a job. The job itself will become easier, casting controllers as network engineers, and less like a twitch video game with serious consequences.

In the long run, private companies may provide such “communications, navigation and surveillance” technology and services themselves but under FAA regulatory oversight – exactly how the rest of the aviation industry other than air-traffic control already operates.

That’s why the rollout of ADS-B is so exciting. It will allow a gradual shift towards aircraft managing themselves and among themselves – or what the industry calls “self-separation.” ADS-B represents enhanced surveillance without extensive ground equipment, which could ultimately mean closer separation standards. Conflict resolution can be done well in advance and flow control can be implemented to smooth arrival and departure traffic.

We believe that local airports and Part-135 operators, working with state and local development officials, will play a key role in fostering a gradual transition to more and more self-managing air-traffic system. They don’t need to change the current system themselves, but just to operate in parallel with it as they implement new technology and show its benefits.

**The challenges beyond technology**

Nonetheless, the current system is in place and will be hard to change, if only because of inertia. It is a national system, supported by national legislators. Although they are elected locally, they get their funding (which supports election campaigns) from traditional, nationwide sources – including airlines, aircraft manufacturers and the like. The airline establishment has a longtime presence in Washington.

“The most difficult problem facing the future air transportation system is gaining agreement between people and interest groups, not the technology itself,” says Charles Huettner, the man who wrote the report that led to the creation of the
The most intense discussions right now concern controller salaries and user fees, with the dreaded word “privatization” hovering in the background. Currently, the airline establishment is lobbying for user fees to replace fuel taxes. Fuel taxes are appealing because they are easy to collect (straight from fuel suppliers), and they apply in rough proportion to value received from the system: Big aircraft with lots of passengers consume lots of fuel and pay more; small aircraft with fewer passengers pay less.

Meanwhile, it’s unclear what user fees would mean, but in practice, they would certainly redistribute the burden towards smaller aircraft. The general notion of user fees (as seen by the commercial airline lobby) is a charge per “transaction” — per takeoff or landing, for example. As Raburn quotes them: “A blip is a blip and an operation is an operation.”

That strikes many people (including us) as unfair, since a 5- or even 60-person jet take-off from, say, Fort Wayne takes much less infrastructure to handle than, say, an incremental 767 take-off from O’Hare, which is already at peak capacity. Just as in electricity production, it’s the incremental capacity rather than the base capacity that ends up being most expensive. So the general aviation crowd rejects user fees entirely. We think the idea of user fees makes some sense, but only if they are calculated according to some capacity measure such as passengers or aircraft size, as well as airport traffic density.

Meanwhile, there’s another problem with user fees: While federal fuel taxes can be changed only by Congress, user fees are an administrative matter and could be changed almost unilaterally by the FAA or other service providers.
General Aviation, Release 2.0

This whole air transportation market is ready for a broad overhaul. Air taxis won’t have much impact on commercial aviation for some time; the number of passenger trips on air taxis anticipated by the most “official” forecast (see resources, next page) is less than 1 percent of the number of commercial-flight passenger trips. However, they will both reflect and drive a broader shift in how flight operations are managed.

And if the market really fulfills its promise, it will draw people off the roads – not perhaps in numbers that will clear the highways, but in numbers that will matter a lot to the air-taxi services and their customers. To give a concrete example from a report by Matt Andersson and colleagues at CRA International, air taxis should save about 35 million person-hours in reduced travel time in 2017.

However, there’s no reliable way of sizing this market. You simply can’t predict demand for a genuinely new product. For example, housewives surveyed early last century weren’t interested in dishwashers, because they simply couldn’t believe that the machines wouldn’t break their dishes. Demand for air taxis is likewise hard to figure. The FAA’s supply assumption – about 3500 jets in air-taxi service by 2017 – could be ironically determining for this demand-driven industry: That would indicate a supply of about 7 million flight hours at, say, $700 per hour or about $5 billion in revenues in 2017. That’s an extremely rough calculation, but it indicates an order of magnitude. Of course, if demand is high and the operators make money and attract more funding, production and supply will rise faster than predicted. And if not... the market will be smaller.

But all these figures are projections. This vision works only if the models work, if traffic patterns match the models and can be optimized as predicted, and if customers can be lured out of their cars.

This market looks inevitable to those in it, but it is fraught with uncertainties. Demographics and incentives are all very quantifiable, but how do people feel about flying in a cozy plane with strangers? It’s one thing to lounge around in a Gulfstream with Michael Bloomberg or even to sit with 100 strangers on a large plane (you can ignore them all), but quite another to sit knee-to-knee with a fellow traveling salesman for 60 long minutes. Many of the companies we talked to noted that their pilots must be good people people as well as competent pilots – bartenders of the air, so to speak. Security is a prerequisite for everything else, but pilot charm will provide competitive advantage.
Indeed, many people are scared of flying in small aircraft, something people in the small-aircraft world tend to forget. Marketing will help; people were once scared of cars...and of course the trolley-bus owners of the early 20th century – the so-called “traction trust” – fanned those fears, as Jim Coyne of the National Air Transportation Association points out. In the same way, the big airlines like to paint themselves as safer, even though corporate/business aircraft (as opposed to those piloted by owners) have a remarkably good safety record, probably due in no small part to the strictness of the FAA.

Flight School: Air will bring together the crowd of start-up air-taxi operators, established charter carriers, aircraft makers, regulators, financiers and other players to explore the complex, emerging air-taxi marketplace. Register today at:

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NAME AND BILLING ADDRESS ____________________________

SIGNATURE ____________________________

Please fax this form to Brodie Crawford at 1 (212) 924-0240.

Payment must be included with this form. Your satisfaction is guaranteed or your money back.

If you wish to pay by check, please mail this form with payment to: Release 1.0, 104 Fifth Avenue, 20th Floor, New York, NY 10011, USA. If you have any questions, please call us at 1 (212) 924-8800; e-mail us@release1-0.com; www.release1-0.com.