

EVA Interviews Rex Ridenoure, CEO of Ecliptic Enterprises



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Welcome to the third edition of EVA Interviews: The Business of the new Space Age! Our next guest is [Rex Ridenoure](#), CEO of [Ecliptic Enterprises Corp.](#) - a successful small Space startup famous for its RocketCam™ equipment and images.

EVA: Hi Rex! It's great to have you join us at EVA Interviews and Out of the Cradle. Welcome! As a successful Space entrepreneur, you have had a lot of experience with the issues and challenges facing Space Startups today. We've discussed some of these in the previous editions of EVA Interviews. I'm very much looking forward to hearing your actual experience with these, how you have built Ecliptic from scratch and what insights you have to offer us!

Since these interviews are about Space as well as the business and entrepreneurial aspects of our exodus Out of the Cradle, I always like to start by asking about Space. I know you do have a personal interest in Space. Can you tell us how your interest started and how it has evolved?

Rex Ridenoure: As a boy growing up first in Phoenix and then in a small town in central Nebraska, several experiences and inputs grabbed hold of my attention: frequent travels through the southwest U.S. and prairie states; looking at the Moon for the first time through a telescope; watching Gemini launches and Apollo missions on TV; taking commercial and private airplane flights; putting together models of airplanes and rockets, etc. I thought rockets and hot planes were so...cool!

Science and math courses satisfied me the most through middle and high school, and by the time I was ready for college my high-school advisors had steered me toward engineering. Once at college, a faculty advisor soon pinpointed my innate interest in aerospace, so I declared Aerospace Engineering as my major. I hardly knew what I was getting into, but it felt right!

Each summer I landed an aerospace-related job or internship, exposing me to lab work, FORTRAN programming, aerodynamics, "Big Aerospace" weapons programs and flying. The three experiences that impacted me the most were a one-month internship on the Mars Viking program at JPL, hearing a lecture by [Gerard O'Neill](#) summarizing his space colony concepts, and viewing the first full-scale test vehicle in the Space Shuttle program ("Enterprise") shortly after its roll-out. All of these experiences tilted my interests toward space vs. aero, projects vs. R&D and bold visions and concepts vs. the mundane.

During my junior year I started following the Space Shuttle Program more carefully, and like thousands of others I got the bug to become a Shuttle astronaut. Soon I decided to "pack my resume" by, for example, getting my private pilot's license the next summer.

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In the late 1970s a Hughes Fellowship—the best graduate fellowship program offered by any aerospace firm at the time—got me to Caltech in Pasadena for my MS degree, and for five of the next seven years (in two stints) I worked as a space systems and mission engineer at Hughes on seven separate geosynchronous comsat missions—all Shuttle-launched. At Hughes I saw first-hand how spacecraft are designed, built, tested, launched and operated, how top-notch space-project teams work to get things done and how commercial business practices help to streamline the overall process.

Sandwiched between my two stints at Hughes was a two-year adventure working on the Hubble Space Telescope project at Lockheed in Sunnyvale, working in the group defining Hubble in-orbit crew servicing procedures. I was tapped to potentially be one of the firm's Payload-Specialist astronauts for the servicing missions and got to do space-suited neutral buoyancy simulations and other astronaut-like tasks. It was all great fun. This was the closest I ever got (so far!) to being an astronaut. At Lockheed I experienced first-hand how a large NASA project is put together, how detrimental the inter-center NASA squabbling can be, how "Big Aerospace" works (or doesn't) and how political the NASA astronaut sphere is.

Smaller, simpler satellites and commercial business models intrigued me, and in late 1985 I left Hughes to work in northern Utah on one of the first smallsat-focused startups, which intended to build Shuttle-launched smallsats. Unfortunately, a month after arriving there the Shuttle Challenger blew up—as did my entire reason for being there!

Opportunities at JPL provided a rescue from my doldrums in Utah—that earlier Viking experience, Caltech/JPL culture and Pasadena weather still grabbed me—so I returned to southern California and worked at JPL for the next 11 years, applying nearly all of my diverse background to such projects at Voyager/Neptune, Lunar Observer, Deep Space 1 and several smaller "better, faster, cheaper" deep-space mission concepts. It was a terrific time to be at JPL and very satisfying.

EVA: You've been involved in a lot of interesting projects! Your career path to this point Rex seems somewhat traditional within the Space industry. Yet here you are now - an entrepreneur who has built a very successful small Space company. When and how did you veer from that more typical path you were on?

Rex Ridenoure: My upbringing in the rancher/cowboy culture imposed a personal disposition to follow my own path in a self-reliant if not unconventional or contrarian style. So though I worked for nearly the first two decades of my career in the "Big Aerospace" world, I tended to gravitate toward leading-edge, pathfinding projects, often led by dynamic, creative, unconventional engineers and managers. And since I was a kid I have leaned toward more commercial, efficient, "faster, better, cheaper" sorts of activities and projects. Following bureaucracy, rules and established processes has never been my style.

In 1978, my senior year in college, I had a classic "Ah ha!" moment during my first visit to the Air & Space Museum in DC, while gazing into a large, autographed reprint

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of Robert McCall's iconic spinning space station painting used for the *2001: A Space Odyssey* movie marketing campaign. My eyes locked onto the logo emblazoned on the arriving shuttlecraft: it was a PanAm airlines logo, not the NASA 'meatball' logo." Now, THAT's the way to do a space program!" I said to myself. I bought that reprint and framed it, and it's still hanging in my office.

Experiences at the start of my career working on commercial communications satellites at Hughes—first impressions do make an impact!—taught me the effective way to define and execute space projects (in my opinion): market-driven, project-focused, fast, smart, elegant, robust. The contrast of this can-do commercial style vs. the typical government-led and -influenced style witnessed first-hand later on other NASA projects was quite dramatic, as were the differences between smaller spacecraft with leaner teams and their bigger, well-staffed counterparts.

And after over 20 years of paying attention to grand visions of humanity's space future (a la von Braun, O'Neill, NASA, Hollywood movies, etc.), I simply got tired of hearing about space initiatives (especially lunar) requiring billion-dollar systems just to get started and meeting wildly optimistic operational assumptions just to break even. So in 1997, with 11 years of excellent project experience at JPL and after the notable non-JPL/largely non-NASA lunar mission successes of Clementine and Lunar Prospector (both done for less funding than a typical Hollywood movie), I decided to take the plunge and focus specifically on trying to push commercial space-business practices beyond where they have been completely stuck since the mid-1960s: GEO orbit.

I didn't quite appreciate it at the time, but because I took that plunge I also became a "NewSpace" entrepreneur. And it's been a very fun and satisfying ride since!

One week after the Mars Pathfinder landing in 1997, I left JPL for Microcosm, Inc., a small space systems firm in Torrance, CA. I knew the CEO there well, and I could take the job and not have to move my residence, so it was a fairly easy and risk-free transition. I stayed exactly a year, concluding that engineering services-oriented firms like Microcosm (at least the part of the firm that I was involved with) were not my cup of tea. By virtue of my prior connections with JPL and Hughes, however, during that year I was able to chalk up a notable contribution toward my stated goal: I played a catalytic role in the successful salvage of an errant commercial communications satellite (AsiaSat 3)—a Hughes-built spacecraft stranded in a severely wrong orbit by a Russian launcher failure. It was sent to its intended GEO slot via multiple swingbys of the Moon using an ex-JPLer's novel orbit techniques. Basically, I got all of the right people taking and also led some independent early vetting of the mission performance calculations to help convince me and others that the proposed concept would work. This was and still is the ONLY commercial spacecraft that has traveled farther than GEO.

About half-way into my year at Microcosm I learned about SpaceDev, a brand new commercial space firm founded by ex-software entrepreneur Jim Benson with the stated goal of making a business out of defining and conducting commercial deep-space missions. This was exactly what I wanted to do, so after some vetting of Benson, his small team at SpaceDev near San Diego and their early mission concepts, I hired in as Chief Mission Architect. Again, I didn't move my residence, but it sure was a long way to work: 137 miles one-way! (Fortunately, Jim allowed

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me to telecommute a lot.) I had a great experience there for the first year, but then I felt that the firm's focus became adrift and my dissatisfaction grew every month.

Just at the right time, in late 1999, all of my concerns fell away when I heard about another entrepreneurial space firm that had just started up in Pasadena only two miles from my home. Bill Gross, founder and head of the dynamic Internet "incubator" firm Idealab (idealab! back then), had started a company to attempt the combining of world-class space systems and Internet technologies with the Hollywood approach to projects. Bill wanted to define and execute the first commercial lunar mission, with a lander that would re-visit one of the Apollo landing sites and stream rich video and imagery to the entire Earth via the Internet—and tell a compelling story during the entire journey in Hollywood style. I hired in as the second employee, again as Chief Mission Architect, and immediately waves of top-notch engineers, software developers, creative minds and business people started hiring in. We worked side-by-side with Hollywood director Jim Cameron, Apollo astronauts, leading lunar scientists, world-class spacecraft engineers, Internet gurus and more—and it was invigorating every day. Soon the firm was re-named BlastOff Corporation (from Spacelab!) and in just six months or so we had 50 employees, a baseline mission and system design, a rocket on order and a huge head of steam. Sadly, the dot-com bubble began to pop in late 2000 and the entire BlastOff effort came to a screeching halt on January 17, 2001, due to lack of financing. I was there exactly a year and it was one of the most satisfying years of my career.

One potential source of funding that I was chasing before BlastOff shut down was Peter Sperling, who, along with his father, had become a billionaire by building up the University of Phoenix over two decades. I had met Peter when I was at SpaceDev and figured he might be interested in the BlastOff effort. BlastOff was shut down the day before our third meeting with Peter, but we decided to have the meeting anyway. When Peter learned that there was a crack team of fifty commercial space entrepreneurs now unemployed and looking for work, he got VERY excited. He challenged us to peel off a dozen or so of the 50 and start a new product-oriented commercial space firm. About 30 ex-BlastOff employees initiated a series of soul-searching meetings in my living room and other venues in Pasadena, and in about three weeks we were down to 11 and had a business plan in mind that Peter said he would support, so we shook hands and decided to start a new firm. In three more weeks Ecliptic Enterprises Corporation opened its doors in Pasadena, and I became a CEO! This six-week period was the only time in my entire career that I was unemployed.

EVA: Could you very quickly tell us about Ecliptic's business (www.eclipticenterprises.com)? Your company name may not be as well known as that of one of your best products - RocketCam™. It has been responsible not only for conveying and enhancing the excitement of a launch but for solving the problems of identifying and capturing any technical issues that arise during that launch. The most successful companies, in my opinion, are created to solve problems their customers face. What problems was Ecliptic created to solve? How has that changed over time?

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Rex Ridenoure: Ecliptic was formed more on the basis of intuition and faith than the classic process of matching market assessments and perceived customer demand with a well-conceived technological solution and business plan. In fact, after about two weeks of tossing around and discussing different elements of our entrepreneurial ideas, I personally wrote the 40-page business plan in about 3 days. And I had zero experience writing business plans, so I followed verbatim what a business plan guidebook advised.

The collective intuition of the original 11 employees, led by 5 co-founders, suggested that there was an unmet need in the space marketplace (rockets AND spacecraft) for integrated, end-to-end onboard video and imaging solutions—not high-end, science-quality content, but simpler stuff like you see on YouTube now. RocketCam™ is now a synonym for this sort of space-based imaging. We wanted to address not only the onboard cameras but also the image handling, data-transport, telemetry and reception aspects of the overall problem. A catch phrase that became popular several years after we formed Ecliptic is “situational awareness.” In essence, what we had in mind at the time (though we didn’t call it this) was providing improved situational awareness for various space project stakeholders: the mission funders/sponsors, the rocket and spacecraft builders, the owners and operators of the rockets and satellites, the space insurance community, the interested public, media outlets, etc.

Since video and imaging on such platforms mostly captures mechanical events (rocket stagings, spacecraft deployments, etc.) and local environmental effects (rocket exhaust plumes, debris, etc.), we knew from the start that we’d mostly be trying to capture easily describable physical events that were inherently interesting to a diverse “customer” base.



Amazing view from
RocketCam™ 2003

Faith entered the picture in two ways. First, even though we couldn’t prove it, we all had faith that our intuition about the market was correct. We had experienced the enthusiasm for what we were trying to do at BlastOff—landing lots of video and imaging cameras on the Moon and returning their data to Earth—and knew that some of the most memorable images from the Apollo era (e.g., the iconic sequence of the Saturn instrument section falling away) and Shuttle era (e.g., the MMU-outfitted space-suited astronaut floating freely in space) were from such imagers. Second, our Angel investor, Peter Sperling, had faith that this maverick bunch of ‘rocket scientists’ would eventually figure out what to do. (In fact, he called our business plan a “faith-based business plan.”) Plus, we formed Ecliptic quite explicitly to be a commercial/entrepreneurial space firm (Ecliptic ENTERPRISES Corporation), and intended from the start to push proven commercial business practices into the Earth-Moon-Mars arena. Peter became a billionaire by following a similar path in the college-level education arena (via the University of Phoenix), and he and we had faith that similar opportunities to disrupt the status quo with commercial approaches existed in the deep-space arena. This formula has worked time and again as long as businesses have existed.

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Today, we describe our overall corporate mission as “making space more accessible to commerce and the public.” Our focus from the start has been to carefully target our markets and customers, penetrate them incrementally while keeping a balance between commercial, civil and defense projects, apply commercial practices aggressively in all we do, maintain solid financials, and hype only those things we have actually done. We execute nearly all of our contracts on a firm fixed-price basis, and never do cost-plus work or SBIRs. We have been profitable 14 quarters in a row and our financial statements are squeaky clean, audited by Ernst & Young. Without getting into specifics, I know that from 2005 to 2008 Ecliptic’s earnings were far higher than two small publicly traded NewSpace firms that combined had 14x more gross revenue than we did.

I should add here that the single most significant boost to our business was the combination of the Shuttle Columbia launching WITHOUT a RocketCam™—one was used for the first time on a Shuttle just two missions before—and RocketCam™ capturing the large piece of foam falling off the External Tank during the Shuttle Discovery Return to Flight Mission 2 ½ years later. This contrast provided an emphatic demonstration of RocketCam™’s value. The onboard RocketCam™ video from SpaceShipOne during its two Ansari XPRIZE flights also gave us quite a boost—globally.

EVA: Ecliptic is unusual in having an Angel Investor involved before the creation of a Space startup. Can you tell us, from the entrepreneurs’ perspective (in later interviews we’ll explore the observations of Angels), the lessons you’ve learned from dealing with an Angel Investor. Is Peter your only Angel Investor? Has bootstrapping and his involvement been sufficient to finance Ecliptic? Have you ever considered or used the next stages in the financing pyramid - Venture Capital firms or strategic investment made by a larger corporate entity like a partner or customer?

Rex Ridenoure: Peter is our only investor and has always been our Chairman. We became self-sufficient solely with his initial startup investment, another investment to acquire the RocketCam™ product family from its original firm (from Crosslink, Inc. in Colorado, 6 weeks after our startup) and some later funding increments, the last of which was in 2004. He’s been very patient with us and a good mentor.

Since leaving JPL almost 12 years ago, I’ve worked on various space projects either funded by or involving about a dozen billionaires, and the pattern I see is that they all have multiple passions, are savvy businessmen, tend to be frugal and wise if not cautious in their financial decisions, are goal and results-oriented, commercially minded, and rely heavily on their personal chemistry with those they invest in—and it’s almost always people they are investing in, not just the idea or technology.

One thing Peter insisted on when we formed the company was that all founding employees and subsequent hires have “skin in the game,” so we all own part of the company. This is fairly common with tech-oriented entrepreneurial firms but not in “classic” aerospace circles unless you’re in senior management. Personally, knowing

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I have a personal stake in Ecliptic's outcome—plus or minus—is a good motivator, as it is for all of our employees.

We have never sought VC funding at Ecliptic and have little interest in doing so. The price for that sort of funding—what we have to give up for it—is too high for our taste. We do see some value in strategic investments by partners or customers and have had some discussions along these lines since 2006. But so far we haven't acted on any of them—or HAD to act on them due to a wobbly financial condition or whatever. There's no better feeling as a CEO than to know that your firm has its own momentum—destiny if you will—and that you can largely call your own shots. The opposite—being desperate—must be hell!

EVA: You said earlier that after leaving JPL, you ideally wanted to keep your residence in Pasadena. How important do you feel location is to a NewSpace company? What factors are most important? When you meet with other Pasadena-based CEOs, how do you find your challenges in the Space industry differ from theirs?

Rex Ridenoure: The importance of location depends on the nature of what the NewSpace firm is trying to do. If it's developing a new suborbital vehicle (e.g., the SpaceShip Company or XCOR), then it's of benefit to be near a spaceport like Mojave. If it's a new rocket (e.g., SpaceX), then they'll need engine test stands and launch sites in various places. For a space hardware firm like Ecliptic, all of what we build can sit on a small section of a lab bench, and most of our incoming parts and outgoing flight hardware shipments come and go via FedEx and UPS.

About the only thing I care about work-wise with respect to location is that there's an airport nearby, and out here in Pasadena there are four within an hour of here. Our best customers are all over the country and it doesn't really seem to matter where they—or we—are located. E-mails, telecons, faxes and an occasional face-to-face meeting are about all we need to keep things running smoothly.

We do bump into the location issue now and then with respect to hiring new people into the company. Often, if the candidate doesn't live within driving distance already they can't afford to move into the area, and even if they are within a 30- to 60-minute drive, many don't want to slog through the LA-area traffic to get here. We've been fortunate to find good people that also live "close enough." (I've been spoiled rotten for the past 9 years, first at BlastOff and now at Ecliptic: my home is only 2 miles from the office!)

I've been participating regularly for a couple of years in a monthly Pasadena-area tech firm CEO breakfast meeting, where 8 or 10 of us CEOs shut the door and discuss all of the gnarly issues we're dealing with at our firms. Most of these firms are in Internet, software, media, energy or biotech markets; Ecliptic is the only space-technology firm. In general, I observe that the other CEOs spend much more of their time and energy trying to be fast, because their markets evolve blazingly fast compared to space. So in my case, the slower pace seems to be an advantage.

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Also, because their firms are typically growing at a faster rate, the CEOs seem to be focused more on raising their next round of investment (often from VCs), finding their next cadre of good managers and trying to get their firm's message heard amidst the media clutter in these markets. Most of these firms don't have to deal with many of the typical issues we aerospace firms deal with: government-dominated procurement processes, ITAR, the influence of the big primes, etc.—though Google and Microsoft are often touted as their Big Gorillas. Most of these firms are very, very commercial and “trendy” in style. Their business vocabulary isn't very similar to mine. These CEOs seem to have an extensive professional network across many disciplines, and most have been around the entrepreneurial block much more than I have.

EVA: What currently are your biggest challenges? And opportunities?

Rex Ridenoure: During the first three or four years at Ecliptic I learned the three big lessons of being an entrepreneur:

- 1) Never run out of cash
- 2) Never, EVER run out of cash!!
- 3) Never stop marketing and selling your firm

We model the company like a 3-legged stool sitting on a rug, the rug representing our chosen markets. One leg of the stool is “Getting New Work”; another is “Doing Work”; and the third is “Billing and Collecting for Work Completed.” If the rug is chosen correctly and the three legs are balanced, then we generate a stable seat: earnings (cash). If one leg falters, the stable seat tips and we're in trouble. All of this functions because of good people, so we try to be picky about who we hire. And we're not always right with our hiring—no one is.

I focus mostly on choosing the right rug and getting new work in the door; my Director of Engineering (a critical position) worries about getting the work done on time and correctly; my CFO birddogs the third leg. The biggest challenge we've had is with making sure these elements and processes are in place and balanced. It doesn't take much of a glitch in just a single leg to make our days (and nights) miserable. Two legs out of whack is a nightmare!

Fortunately for us, and unlike many other firms, marketing is relatively easy. The cool RocketCam™ videos from our launches every 4 to 6 weeks pretty much sell our products for us. In some markets we have global brand awareness, which for a small firm like Ecliptic is priceless. All I have to do is make sure the RocketCam™ brand and Ecliptic are tied to those videos and that people know how to find us, and the rest happens fairly naturally.

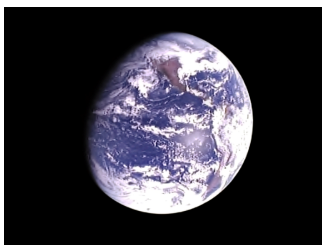
Two other challenges are worth noting. First, it's difficult to do long-range business forecasting when the typical cycle between identification of an opportunity is 3 to 12 mos. or so and the build/test/delivery cycle for the order is less than 6 mos., and when most of our customers order in onesies and twosies, i.e., not in quantity. (Our current business base is what we call “lumpy”.) Our firm business backlog projection is always near zero 9 to 12 mos. out, and any projections we might make for greater

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than a year out are pretty much guesses. This keeps us on our toes to be sure—planning, executing and hitting our financial targets.

Second, there are only so many rocket launches per year globally and only a few spacecraft (at most) per launch, so right there our addressable core market for RocketCam™ is limited. Throw in ITAR and about half the market—the non-U.S. part—is much more difficult to service. So we're looking for ways to expand RocketCam™ into other markets like UAVs, commercial aircraft, other mobile vehicles, etc. There are many players in those markets already, and very few in our core market. And we don't understand those new markets nearly as well as space. So the new markets are harder to penetrate.

One of the bigger opportunities we've been chasing for the past few years is to expand RocketCam™ more into the spacecraft arena. We've been on four spacecraft so far since 2005—two in LEO and two at GEO—compared to 62 rocket launches since 1997. (RocketCam™ was at Crosslink from 1997-2000, 17 launches.) RocketCam™ is on the launch pad on its first mission heading to the Moon in May (LCROSS), and it's on a half-dozen more spacecraft in the pipeline, including two more to the Moon (GRAIL) in 2011. There's still a lot of room for growth here, and things are getting exciting.



Announcement coming soon about this image!

We've also been seeking to show that we can create a new revenue stream for Ecliptic by selling the RocketCam™ video content in clever ways. But to sell it you have to own it, and that's been our problem for years: we didn't own the video, our customers did. We finally catalyzed an opportunity to demonstrate this business model early this year and it will be publicly announced by our partner March 25th! It's a very commercial idea, unique, and just what we'd like to do more of.

We're also looking for additional strategic partners to enable Ecliptic to expand into new markets, grow, diversify and become a bit more stable. For some markets, this means an aerospace prime; for others it means a commercial media firm. Other exciting opportunities would be enabled simply by finding enthusiastic investors who want to be part of the opportunity. I always have 5 or 10 neat opportunities floating around in my head that aren't quite on the front burner yet, so there's no shortage of ideas.

EVA: Speaking of opportunities, the Moon is drawing you back and we'll be very excited to see the images from the RocketCam™ on LCROSS! The other Moon project, and the one that most resembles BlastOff, is the [Google Lunar X PRIZE](#) - with many teams competing to do what BlastOff was designed to do. Is Ecliptic involved with any of the teams, providing them with imaging technology? In any other ways? Another point you made seems very timely as well - your description of your focus on "situational awareness". With the recent satellite collision and debris threats to the ISS, Space Situational Awareness has been making headlines. It is a major issue

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affecting government/civil, commercial and security/military activities in Space. Are there opportunities to use your technology to address some of these problems?

Rex Ridenoure: Within the first two days after the GLXP was announced in September 2007, I got calls from four different team leaders (all of whom I knew already) asking about whether Ecliptic could supply their team with onboard imaging systems. That sort of brand validation was very satisfying, to say the least! Having been sensitized years before about how hard fielding any mission to the Moon is, especially soft landers, I was generally skeptical about any team's chances for winning the GLXP (not even knowing much about what the detailed rules for winning were). I was cautious about throwing Ecliptic's good brand name behind any concept that I knew next to nothing about. So, like any other poker player, I decided Ecliptic would play poker!

I registered Ecliptic as a "stealth" team at the end of 2007, with the notion that we'd participate for as long as it took to figure out how many other teams were competing and which ones we'd prefer to be part of. As it turns out, in just a month or so I learned of another stealth team based in Southern California, led and staffed mostly by ex-Hughes space systems engineers and managers, many of whom I worked with in the 1980s and knew personally. Once their concept was revealed and discussed with me—a very clever spinning lander/hopper—I decided on the spot to weigh in with that team. This team became known as the Southern California Selene Group or SCSG. Between the 10 of us ex-Hughes types we had personally worked on over 500 real space missions!

By May 2008 SCSG's end-to-end mission and system design for winning the GLXP had been refined to the degree that I was very confident we had a winning approach. The rocket and kick stages had been selected, overall lander configuration laid out, tanks, thrusters and equipment largely scoped and priced from various vendors, and facilities within which to operate the team and assemble the lander lined up. It felt a bit like BlastOff all over again.

Sadly, in June the team leader opted to withdraw from the GLXP competition, for reasons best explained at the [SCSG team pages](#) on the GLXP website. Now, Ecliptic is still a candidate supplier to several GLXP teams, and we've also covered the costs of filing the patent for the SCSG spinning lander/hopper concept and will control this intellectual property from now on. Ecliptic has no plans to field a GLXP team on its own.

As far as the Space Situational Awareness issues go, our RocketCam™ systems provide this sort of awareness for slow relative speeds between space vehicles and other space objects—for situations like rocket stagings, payload fairing deployments, spacecraft separations, rocket engine firings, rendezvous sequences, etc. Typically, the space-debris and collision events happen at Warp Factor 4 and higher—way too fast for our RocketCam™ systems to detect anything. So we don't expect much of a market for our systems in that arena.

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EVA: Warp 4, eh? Near the beginning of our interview, you mentioned Gerard O'Neill a few times - hearing his lectures and paying attention to his grand vision. He has been an inspiration to many through his books, especially [The High Frontier](#). Written in 1977, his ideas still read well today (after one stops being depressed by how little progress has been made to date). In fact, that book is having a mini-resurgence due to the renewed interest in Space-Based Solar Power. What books (Space or other types) have had a strong influence on your life and where you are today?

Rex Ridenoure: I was a late bloomer when it comes to books. Born severely cross-eyed, I couldn't see clearly at all until I was about 4, after two eye surgeries. Even after healing, reading books wasn't enjoyable for me. So I hardly read much at all from the time I was 6 or so until all the way through college, except for what was required for school—and some occasional comics, magazines and newspapers. I probably hadn't read more than a couple of dozen books for pleasure by the time I was 23. The High Frontier was one of these, however.

O'Neill's vision got my juices flowing for sure—enough so that I dedicated my required senior research project in undergrad school to an element of that vision, and one of my three required research projects in grad school to an assessment of Space-Based Solar Power. Just as I was absorbing these grandiose concepts I starting working on real-world aerospace projects at McDonnell Douglas, JPL, Hughes and Lockheed. What I learned first-hand at these places was that all of this stuff, no matter how limited and focused, was HARD! Especially the space stuff. I've always been a fairly practical guy, and seeing how hard it was to design, build, assemble, test, launch and operate even the "simplest" spacecraft really cooled my jets on grandiose space visions. This is when I started leaning toward "faster, better, cheaper" approaches, commercial practices and elegant architectures.

Inspiration and direction during the first 20 years or so of my career came mostly from OJT—On-the-Job Training—and a few excellent mentors and various role models (very good ones and very poor ones). My undergrad faculty adviser cleverly steered me toward a space career, and once in it I learned many useful lessons from my immediate managers and workmates at Hughes and JPL (especially on Voyager), and was sensitized to the value of what's now called complex systems architecting by a friend and mentor, Ollie Harwood, and a USC professor, Eberhardt Rechtin. During this period I also became much more aware of the terrific biographies of famous disruptive innovator-leaders like Copernicus, Galileo, Newton, Thomas Paine and Abraham Lincoln, and the not-so-famous like Eddington (astronomy), Atanasoff (computers), Johnson (Skunk Works), Minovitch (gravity-assisted space travel), Carlson (xerography) and others. Books that grabbed me in my 20s and early 30s included [Atlas Shrugged](#) and [The Fountainhead](#), [Future Shock](#) and [The Third Wave](#), [Megatrends](#), [The Soul Of A New Machine](#) and others. And the first Sci-Fi film since [2001 - A Space Odyssey](#) that painted a realistic vision in space for me was [Alien](#).

After leaving JPL to be an entrepreneur in 1997, I started reading an eclectic sampling of books to give me a better foundation for being on my own. I was drawn to the perspectives and frameworks outlined in books such as planetary scientist John Lewis' [Mining The Sky](#); Geoffrey Moore's [Crossing the Chasm](#), [The Gorilla Game](#) and [Inside the Tornado](#); and Clayton Christensen's [The Innovator's Dilemma](#). I totally enjoyed real-world accounts like Stephen Ambrose's excellent summary of how the transcontinental railroad was built, [Nothing Like It In the World](#), Neal

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Bascomb's histories of skyscraper evolution ([Higher](#)) and timekeeping (Faster), and Dava Sobel's history of navigation technology ([Longitude](#)). Most recently, I've enjoyed reading the various books by New York Times columnist Thomas Friedman ([The Lexus and the Olive Tree](#), [The World Is Flat](#), etc.) and other Big-Picture treatments of this crazy world we live in.

The take-away here is that countless good examples of how to do things right (and wrong!) can be found in books and well-written articles in newspapers like the Wall Street Journal, and if you take the time and effort to seek them out you can find some excellent mentors that will be thrilled to help you find your passions and realize your dreams. And of course, nothing teaches better than real-world personal experience.

EVA: Rex, you are so right, there are countless good examples out there to find - whether in books, newspapers, on-line interviews 🤖 or to learn by taking action and developing that personal experience. Thank you very much for sharing with us your entrepreneurial journey so far! One last question for you: Let's imagine that later in this journey we are revisiting this conversation as we float in Space (see FAQs) for real - with RocketCam™ video capturing our images for posterity (or a souvenir): What additional actions would you personally like to have taken between now and then to help make our exodus Out of the Cradle a reality?

Rex Ridenoure: Good question! As I have emphasized throughout this interview, the theme of what I've been trying to do since becoming an entrepreneur is to do what I can to push commercial business practices beyond where they have been stuck for decades: at GEO. I've made some meaningful contributions in this regard, but there's so much more that could be done. Progress has been slow—or let's say slower than most of us space enthusiasts would like.

What's been gnawing at me ever since I first heard Gerard O'Neill's talk in 1976 is that as grand and tempting and optimistic and potentially liberating as the suggestion of using extraterrestrial resources is—tapping into essentially unlimited quantities of solar energy, basic and precious metals, water and ice, etc. for the benefit of humanity, commerce and civilization—this idea has NEVER been part of the mainstream dialog of our planet's peoples

Over 30 years later, it's as if *Limits to Growth* (a popular, pessimistic 1972 book that portended global economic collapse in the 21st century due to overpopulation and stretched resources) is still the principal guidebook for the planet's leaders—leaders of all types. In fact, this book was updated in 2002, and its message was basically the same as before. This suggests to me that those of us who have been supporters of the civilization-changing—indeed, species-changing!—vision of moving off-planet to help address these limits collectively haven't been able to get these pivotal issues on the important radar screens they should be on.

Our politicians and much of the public thinks "extraterrestrial" means "alien"; Al Gore didn't mention any of this in his globally popular *An Inconvenient Truth* campaign; these issues aren't discussed on TV or radio, and hardly ever make the news except

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for certain tech-oriented media channels. It's all very frustrating. It's like we're all standing here with a cure for cancer all ready to go and everyone else is saying, "Let's refine our bleeding procedure."

Common excuses we give ourselves for this embarrassing lack of progress are that rockets and launches still cost too much, or that there's no business cases that close yet, or it's just too hard—or whatever. But I think the lack of progress is due to more fundamental reasons tied to cultural paradigms, mindsets and blinders, risk-averse thinking, entrenched stakeholders and power structures, lack of vision, etc. It's not just about the technological barriers, money or business plans. I wish I could do more to move things along, but there's only so much time in the day...

EVA: The fact that you are taking actions Rex to move things along is all any of us can do, and something most of us could do more frequently. The grand visions require many, many small efforts and large ones to come to fruition. Entrepreneurs, like you and others, are starting to change those paradigms. Please keep it up!

Thank you very much Rex for sharing with us how you built Ecliptic so far; your entrepreneurial lessons; strategy; and challenges; and for your excellent observations and insights about the Space industry! I look forward to your updates!

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