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Commercial SSA platforms

Accelerating and expanding the use of space data

Daniel Ceperley (LeoLabs, Inc.)

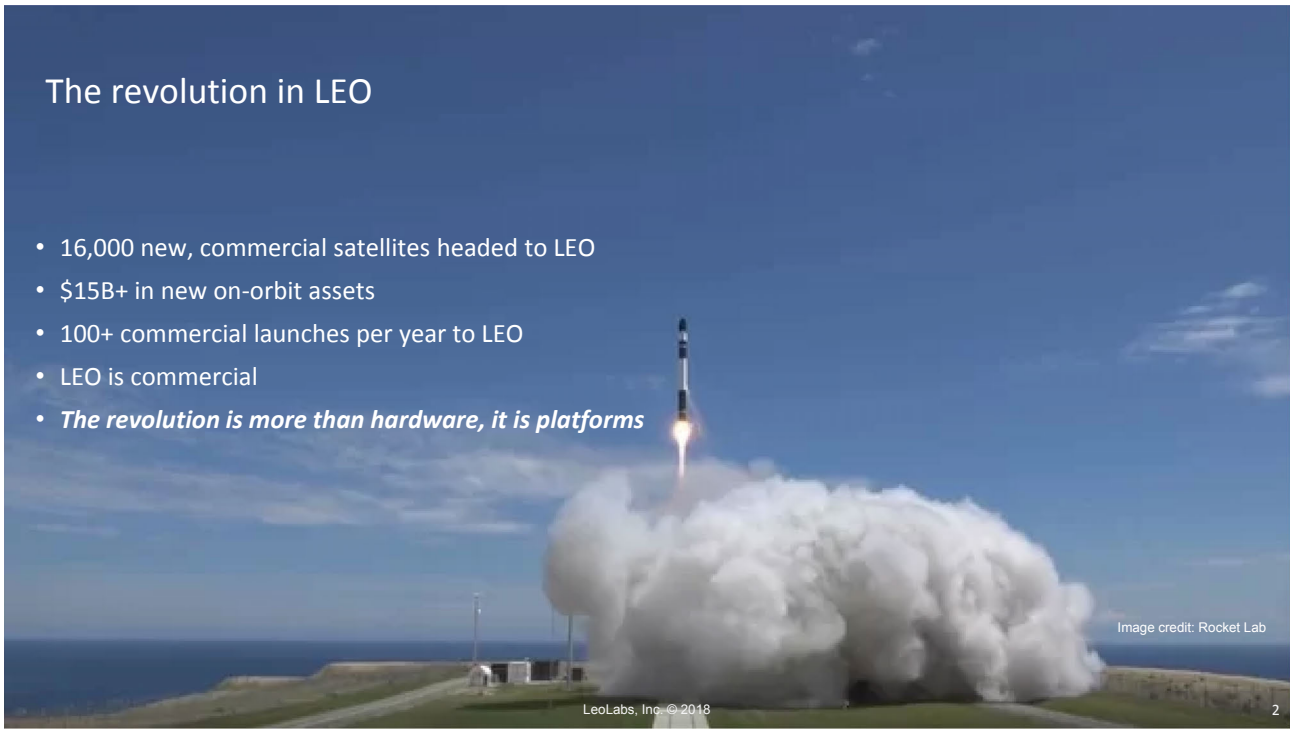
The space situational awareness (SSA) industry is undergoing a fundamental reorganization to address challenges presented by the revolution in low Earth orbit (LEO). The old mode of vertically integrated, government-only services is giving way to a modern architecture in which a mixture of commercial and government services form layers of a software stack. Commercial
software as a service platforms, software packages, and infrastructure as a service platforms are poised to address the new requirements for commercial and government missions.
The recent wave of satellite constellations has pushed LEO past the tipping point to become primarily commercial. Larger constellations, large ride-share launches, and the promise of frequent small-launches is dramatically increasing traffic. New thrusters, active debris removal services, and fully automated fleet management systems are changing the way constellations, and LEO as a whole, are managed.
These changes bring new challenges to all players.
- Safe satellite operations must now include avoiding collisions with debris during long-duration orbit raising maneuvers, spare swaps, and long-duration de-orbit maneuvers in addition to normal operations.
- Regulatory agencies are now faced with answering the questions of what constitutes safe and responsible satellite operations, what is the true magnitude of the risks carried by licensing states, and how to interpret and respond to incidents in space to preserve the space environment while promoting innovation in the space sector.
- Insurers are faced with the questions of what are the true risks to satellites during normal operations and how to assess changes as new satellites are launched and navigated to their operational altitudes, satellites are placed in end-of-life orbits, and new debris is generated that may directly or indirectly threaten insured assets.
- Defense organizations must sort through this traffic in real-time to detect threatening activities, monitor increasingly capable small satellites, and monitor commercial constellations that provide critical services to governments.
LeoLabs is the dynamic mapping platform for LEO. It is a Silicon Valley startup that, for more than two years, has operated a ground-based radar network and software platform. LeoLabs delivers real-time alerts, core operational services, and a catalog of satellites and debris that forms the base layer of the software stack for future satellite operations tools, regulatory monitoring systems, insurance risk analysis applications, and SSA systems. Over the next two years LeoLabs will complete four more radars, prevent collisions with 250,000 pieces of presently untracked small debris, and roll out additional core services.
This talk will address the critical changes in LEO, new innovations in the commercial SSA industry, and LeoLabs' perspective on LEO.

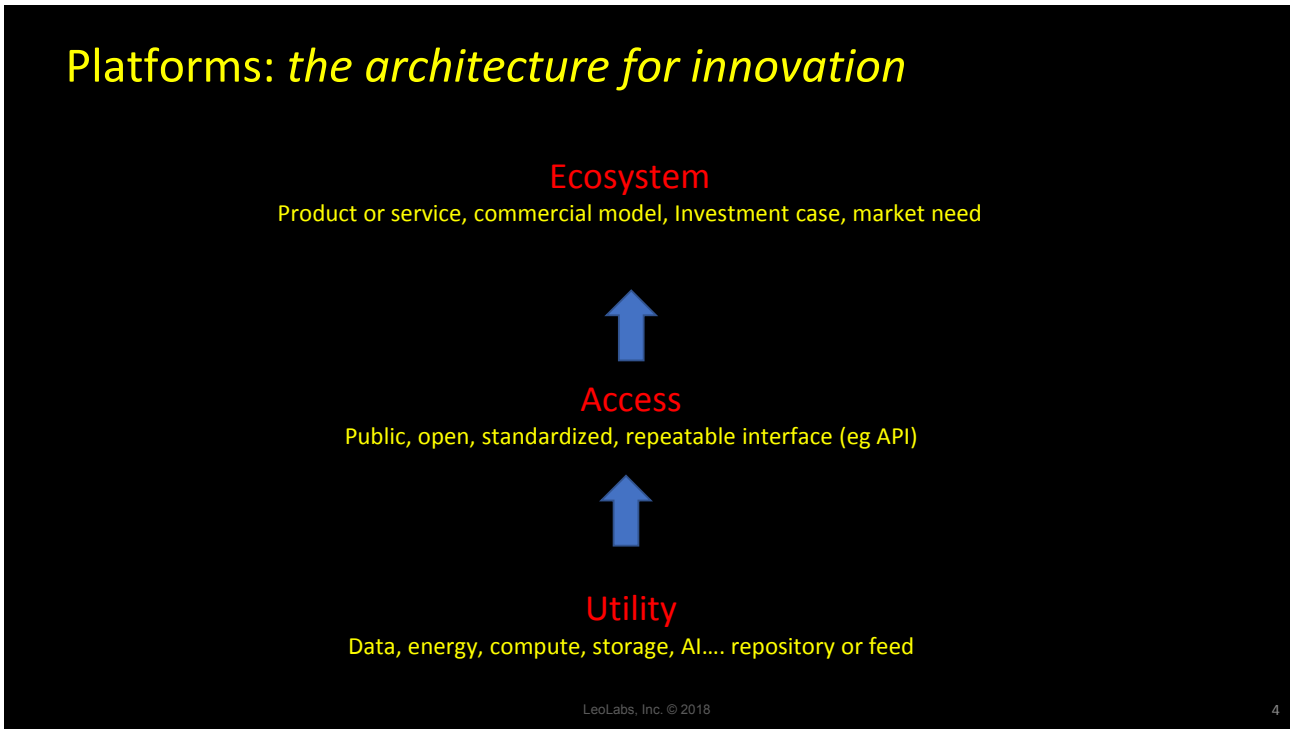
Biography

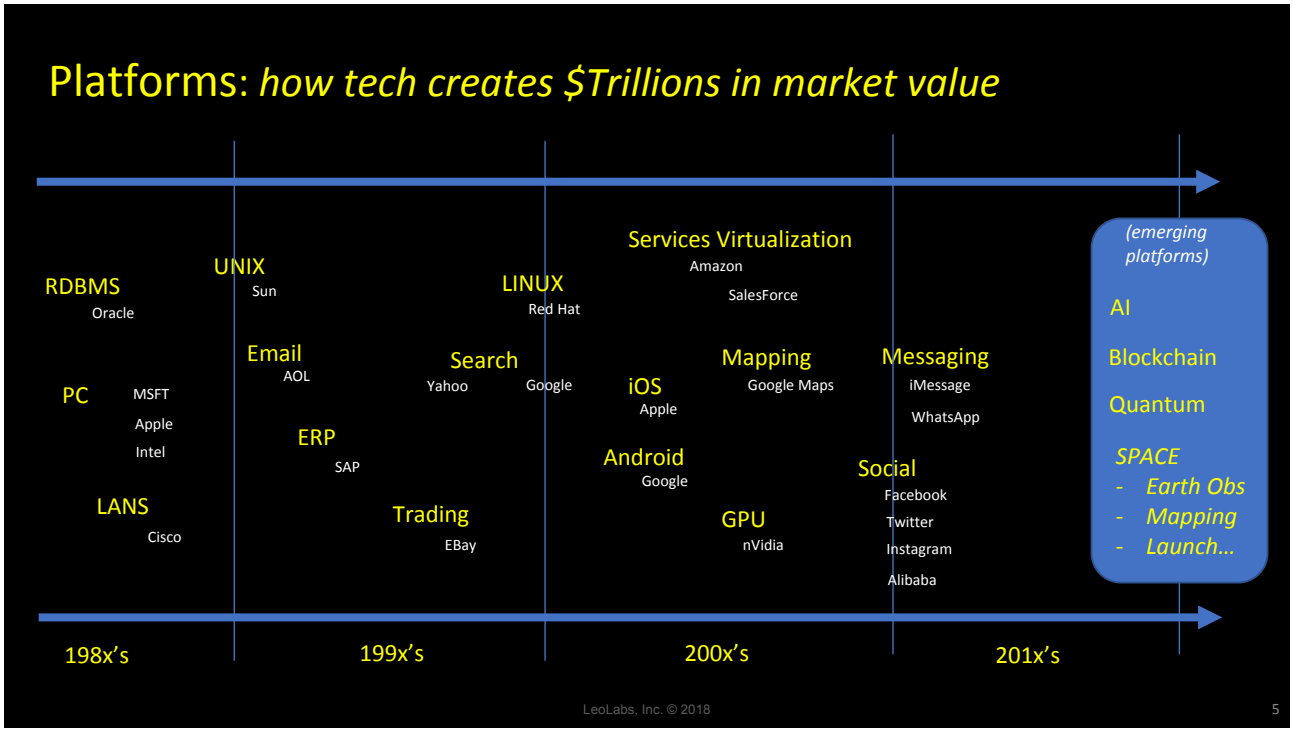
Daniel Ceperly

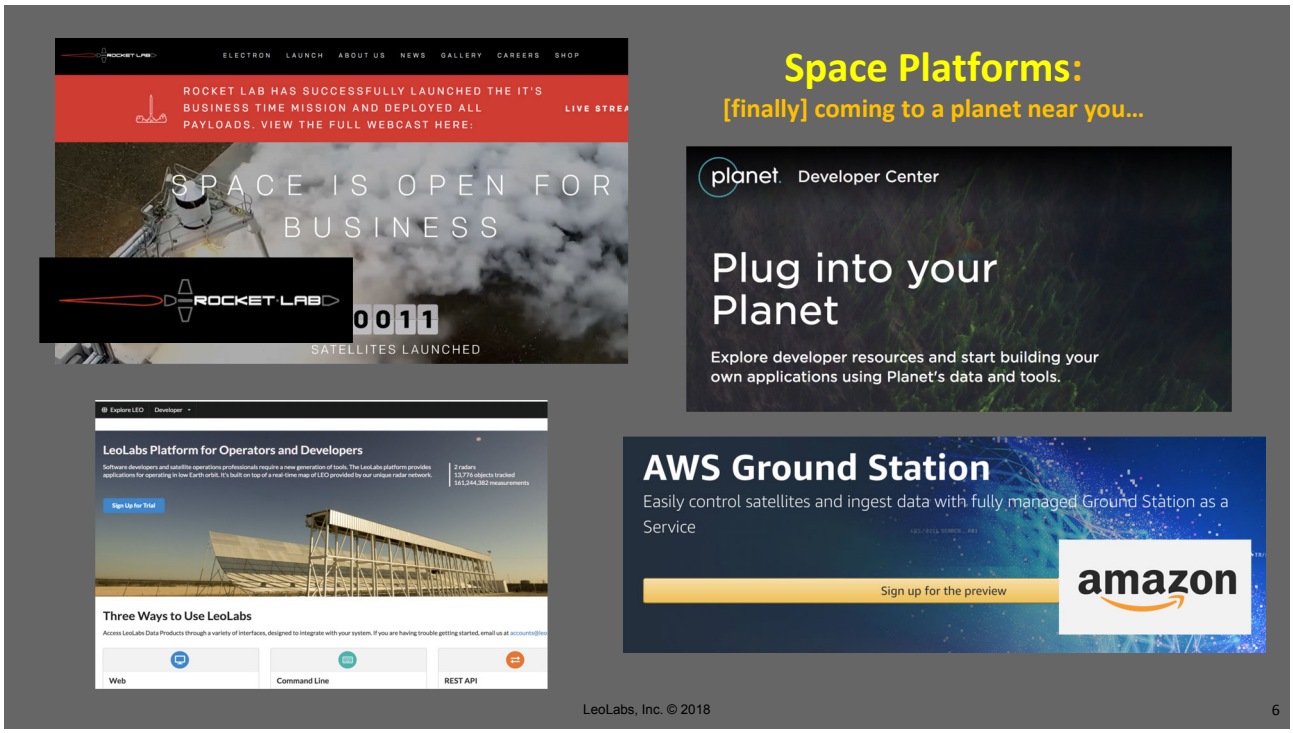
Dr. Daniel Ceperley is the CEO and cofounder of LeoLabs. He, and the founding team, created LeoLabs to drive advances in space traffic safety and preserve the space environment through actionable, real-time information. LeoLabs' services are powered by its worldwide network of radars and cloud-based software system.

Prior to LeoLabs, he worked at SRI International where he was the Program Director for Space Debris Tracking, the Deputy Director of the Oceans and Space Systems Center, and the supervisor for the Allen Telescope Array (a radio astronomy and satellite tracking facility in northern California).
In addition to satellite tracking, Dr. Ceperley has technical expertise in synthetic aperture radar imaging, precision timing and navigation systems, and electromagnetic modeling. He holds a PhD and MS in Electrical Engineering from U. C. Berkeley and a BS in Electrical Engineering from the University of Virginia.



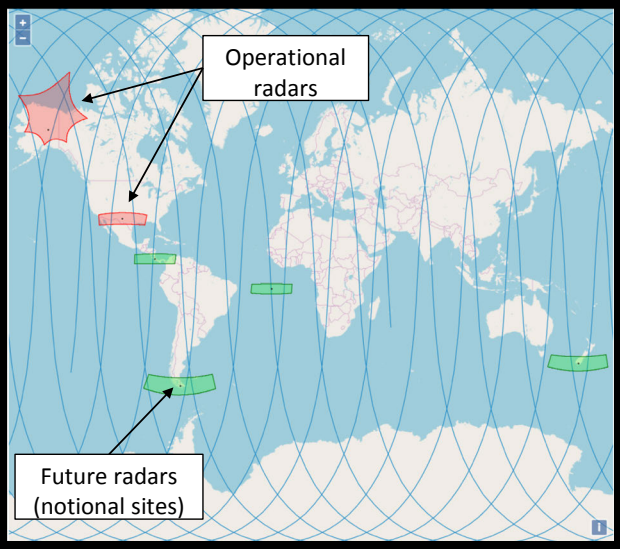






Commercial Space Situational Awareness (SSA) platforms

- Ecosystem of applications
- Software as a Service (SaaS)
- Worldwide sensor networks



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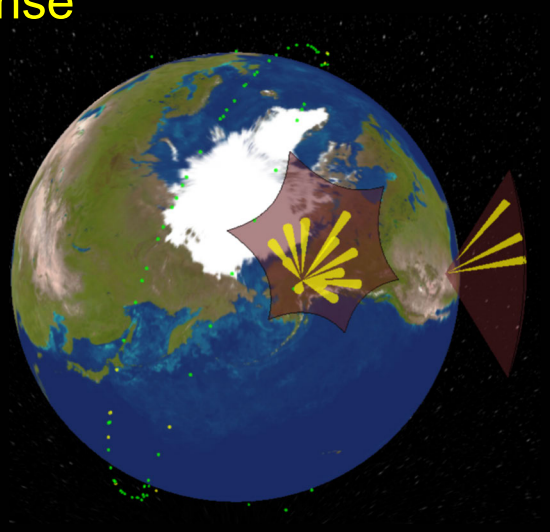
SSA expanding beyond defense

- Constellation operations
- Insurance
- Launch regulations
- Radio frequency regulations



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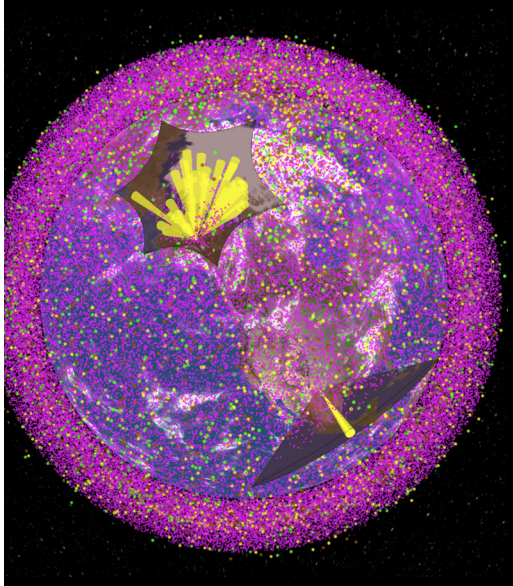

SSA-enabled applications - the future

- Space traffic management
- Risk modeling for insurance
- Communications network management
- In-orbit servicing
- Accident response

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