

The BCG logo is rendered in a white, classic serif font. The letters are bold and well-spaced, with the 'C' having a distinctive shape. The logo is positioned in the upper left corner of a large green rectangular area that serves as a background for the text.

BCG

THE BOSTON CONSULTING GROUP










New Business Models in Space

Roscosmos/TASS conference: "Space as a business"

DECEMBER 2017

Major tech trends impact the space industry and help to address customer needs

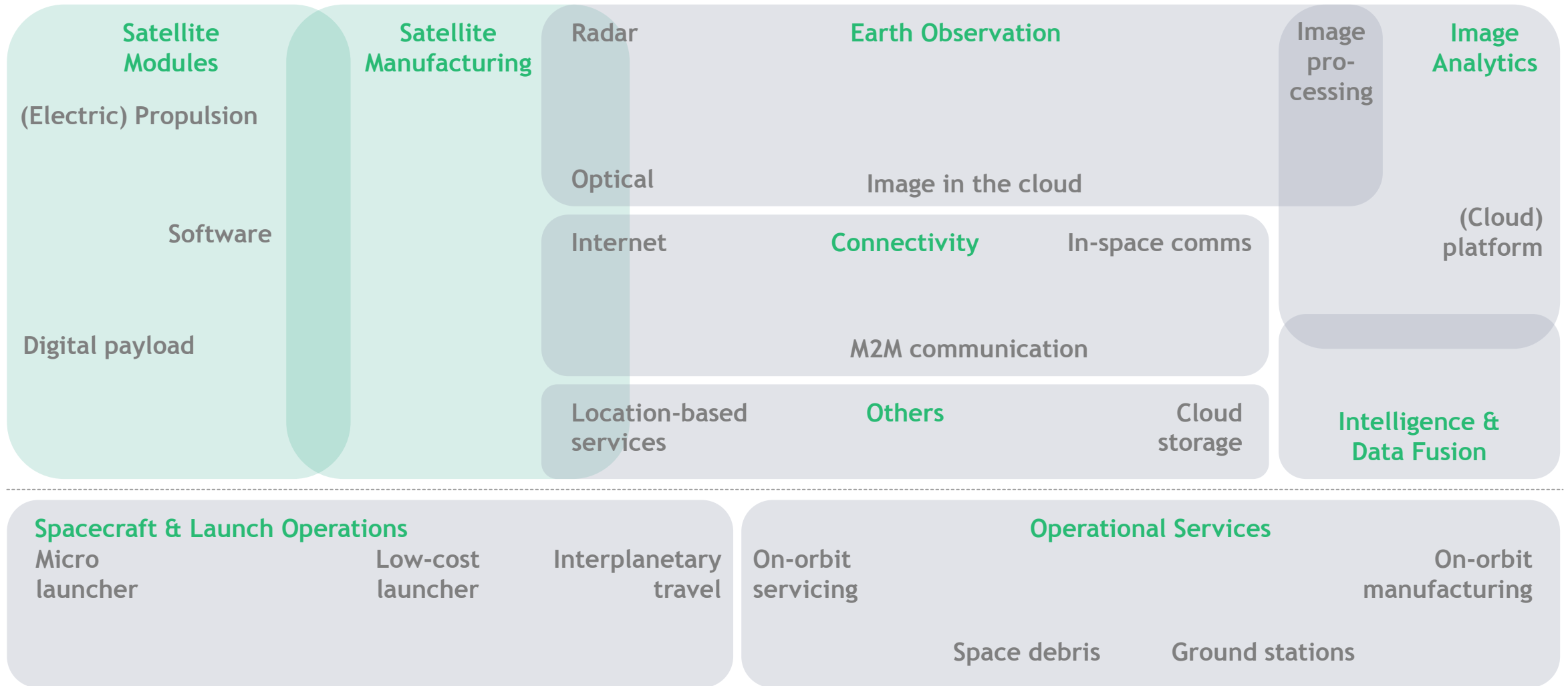
Technology trends are leveraged...

| | | |
|---|--|--|
| Big Data  | Shift to the cloud  | Cognitive computing  |
| 3D printing  | Alternate business models  | Democratization of data  |
| Internet of things  | Advanced robotics  | Simulation & digi. engineering  |

...to address (changing) customer needs

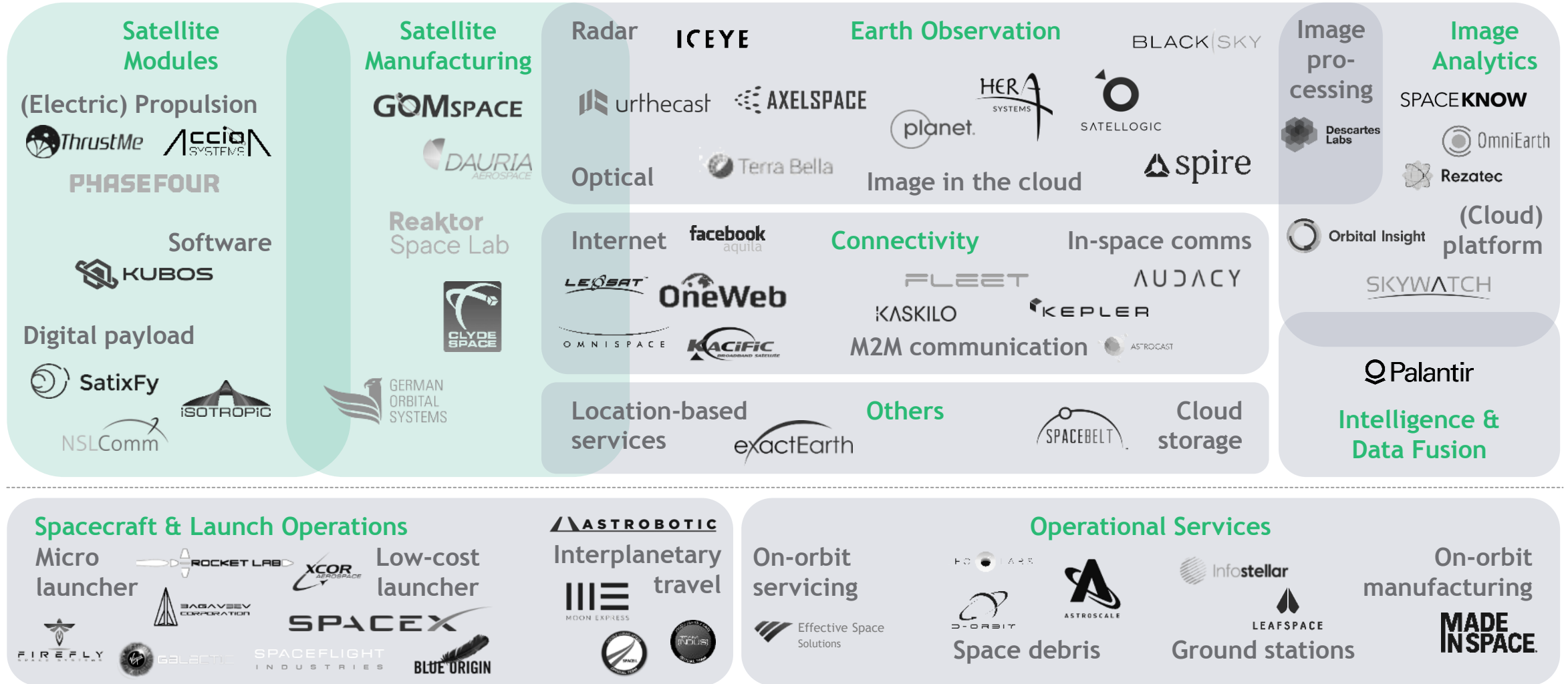
- **Large LEO constellations:** Hundreds of satellites
- **Cost decrease:** Due to production scale (OneWeb effect)
- **Production time:** From years to days/weeks
- **Flexibility:** Flexible/reconfigurable payloads
- **Revisit rate:** Daily revisit instead of traditional tasking
- **Sharing:** For payloads & ground station virtualization
- **Transmission rate:** 10x bandwidth increase
- **Data fusion:** Mult. sources & sensors, e.g. optical & radar
- **Affordable access to space:** Micro / low-cost launcher

New players are rapidly emerging along the space system value chain

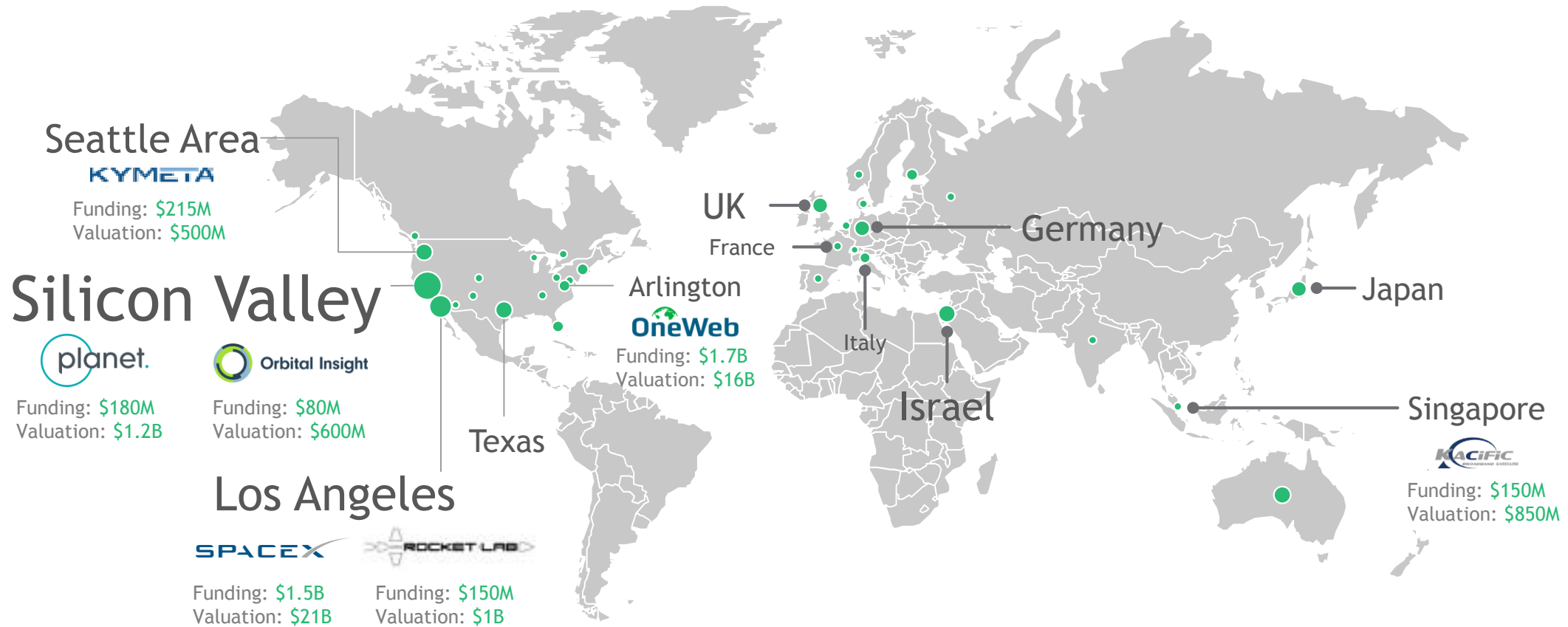


New players are rapidly emerging along the space system value chain

Strong focus on nano- / micro- / small-satellites

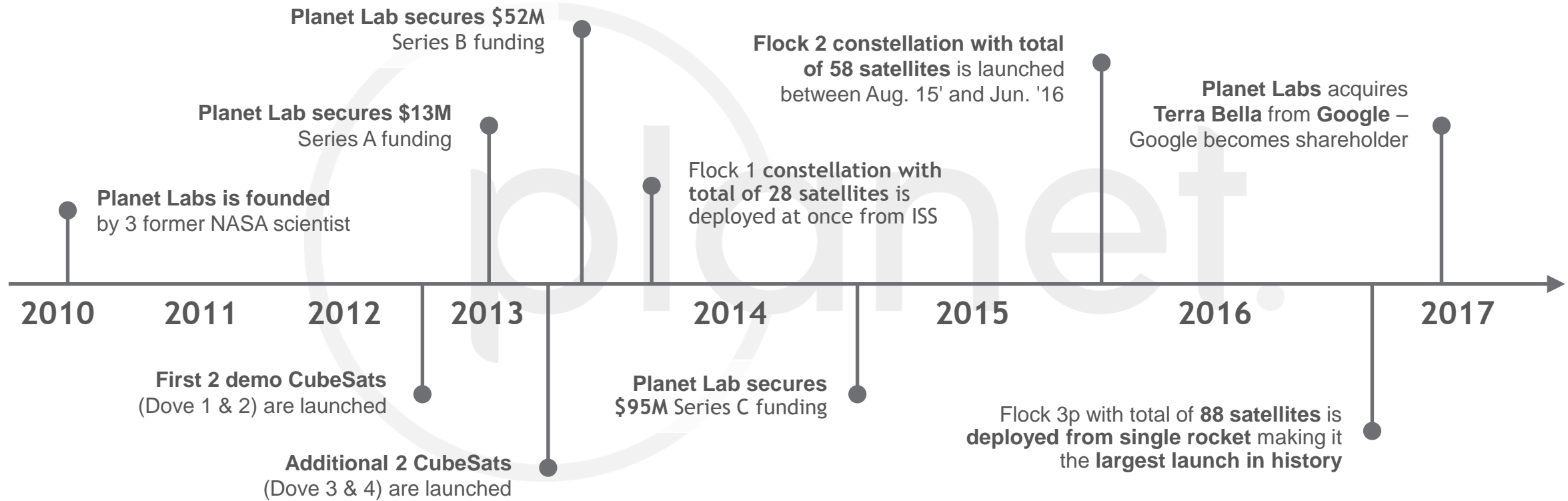


Silicon Valley is the hotspot for space startups - followed by L.A. & Seattle








Heavily funded and highest valued space startups mostly US-based

Earth-observation: Planet rapid build-out of low-cost imagery portfolio

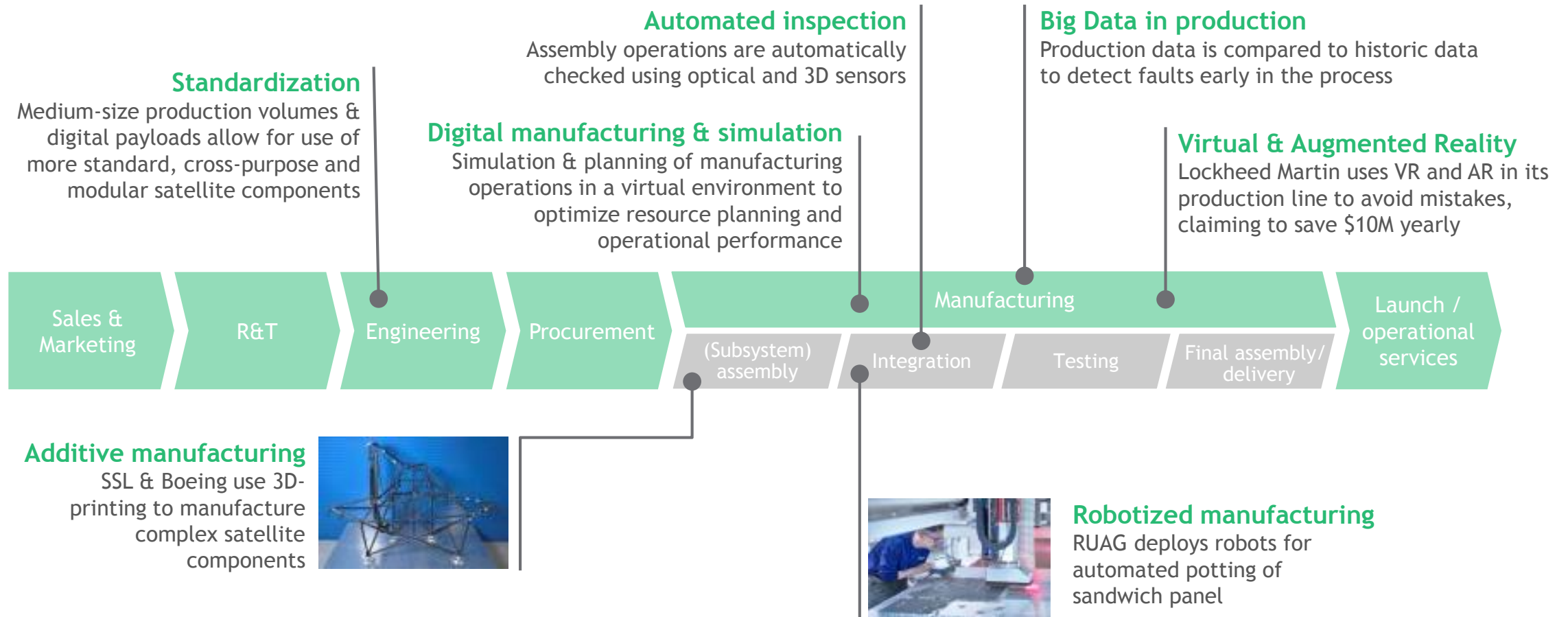


With the Flock 3 constellation, Planet Lab has 149 satellites in operation achieving its initial mission to image the entire world daily - This has been achieved within only 7 years

Connectivity: Providing internet access to 'the Other 3 Billion'

| | Internet | Internet |
|---------------------|---|---|
| Company |  <p>Startup aiming to build a global satellite-based communication network</p> |  <p>Satellite operator aiming to provide broadband internet service to the South East Asia region</p> |
| Products & Services | <p>Bridging the 'digital divide' - planned constellation of 648 sats to provide internet access to everyone globally by 2027</p> <p>Philanthropic mission e.g. goal to connect every unconnected school by 2022</p> <p>Airbus selected as supplier of first 900 satellites to be produced in a Florida factory with 15 sats output per weeks</p> <p>Arianespace to launch first satellites in early 2018 additional launch deals w/ Virgin Galactic & Blue Origin secured</p> | <p>Use of Ka-band high-throughput satellites to provide access to remote location in Pacific</p> <p>Pre-launch contracts w/ Telco providers signed worth more than \$430M</p> <p>Boeing selected as supplier of first satellite 'Kacific-1' that will be based on Boeing's 702 satellite platform</p> <p>Shared 'condosat' launch w/ Sky Perfect Jsat agreed aboard a SpaceX Falcon 9 rocket in late 2019</p> |
| Funding | <p>\$1.7B in VC and private equity funding</p>    | <p>\$150M from undisclosed sources</p> |

Digital innovation also takes place internally, in the manufacturing value chain ...



Overall objective is to significantly decrease production time and enable higher production volumes

... transforms the way satellites are built



Traditional satellite production



Satellite production at Planet Labs



A close-up photograph of a lit sparkler against a dark background. The sparkler is the central focus, with a dense cluster of bright, golden-yellow sparks radiating from its tip. The sparks vary in length and intensity, creating a dynamic and celebratory visual. The background is dark, making the bright sparks stand out prominently.

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