California Aerospace Industry Economic Impact Study

Final Report

A.T. Kearney would like to thank the Aerospace & Defense Forum and the National Defense Industrial Association (NDIA) Los Angeles Chapter for their support of this study

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- **Executive Summary**
- Chapter I – California Space Industry Economic Impact Study
- Chapter II – California Aircraft Industry Economic Impact Study
- Chapter III – Competitiveness of California in Aerospace Industry

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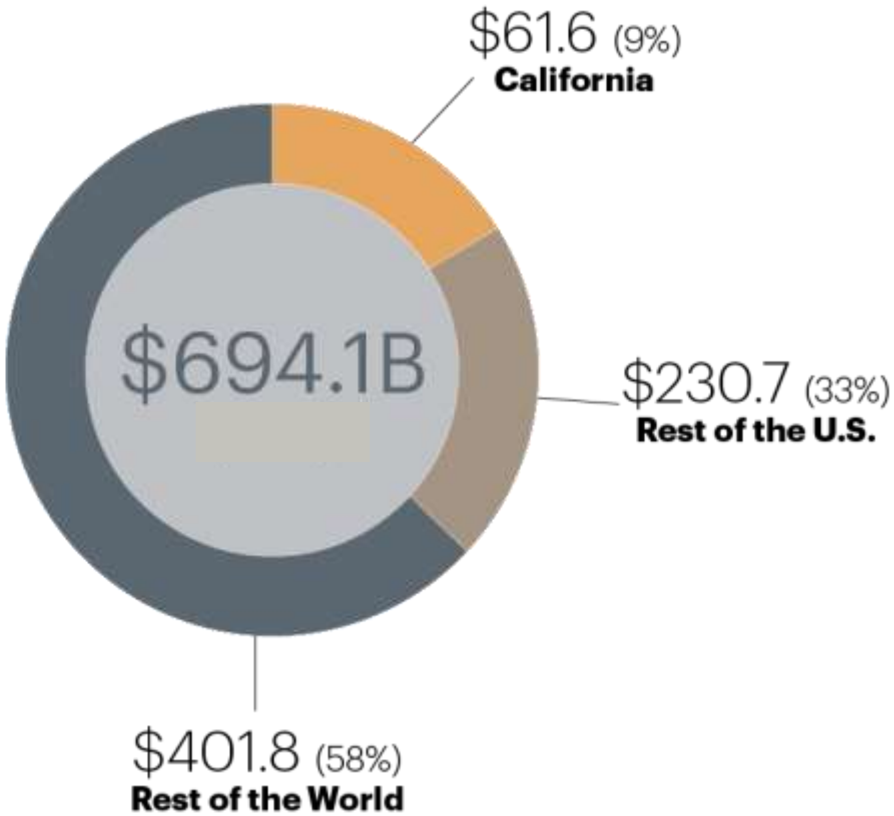
California is a global Aerospace leader, holding 9% of the combined global Space and Aircraft market

Market Share by Geography ($B,%)



Key Insights

- California generated $62B aerospace industry revenues, representing 9% of the global Aerospace market and 21% of the U.S. industry
- Aerospace market includes:
  - Space Industry
    - Launch services
    - Satellite Manufacturing
    - Ground Equipment
    - Engineering Services
    - Satellite Services
  - Aircraft Industry
    - Aircraft
    - Engine and parts
    - SDNGN Instruments[1]
    - MRO[2]

1. Search, Detection, Navigation, Guidance, and Nautical (SDNGN) Instruments 2. Maintenance, Repair, and Overhaul
Source: IBIS; AIA Global Aerospace Market Outlook and Forecast; 2012 SIA State of the Satellite Industry; company annual reports; OneSource company data; FAA; European GNSS Agency 2012 & 2013; Department of Defense and NASA contract database; A.T. Kearney analysis

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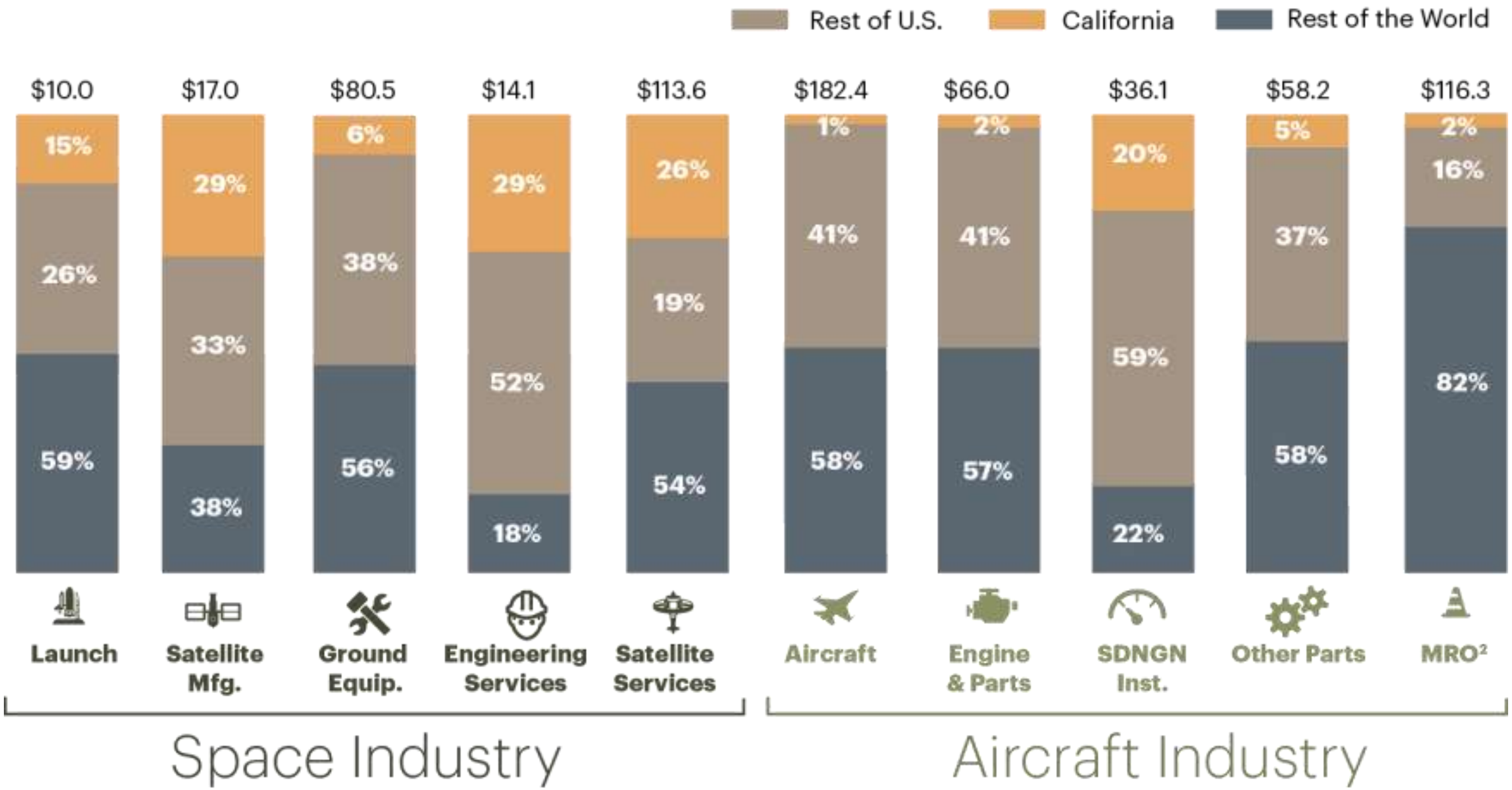
California has leading positions in space instrumentation[1], satellite services & mfg., and engineering services in the global market

Market Share by Aerospace Sector (%)



1. Search, Detection, Navigation, Guidance, and Nautical (SDNGN) Instruments
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Source: IBIS; AIA Global Aerospace Market Outlook and Forecast; 2012 SIA State of the Satellite Industry; company annual reports; OneSource company data; FAA; European GNSS Agency 2012 & 2013; Department of Defense and NASA contract database; A.T. Kearney analysis

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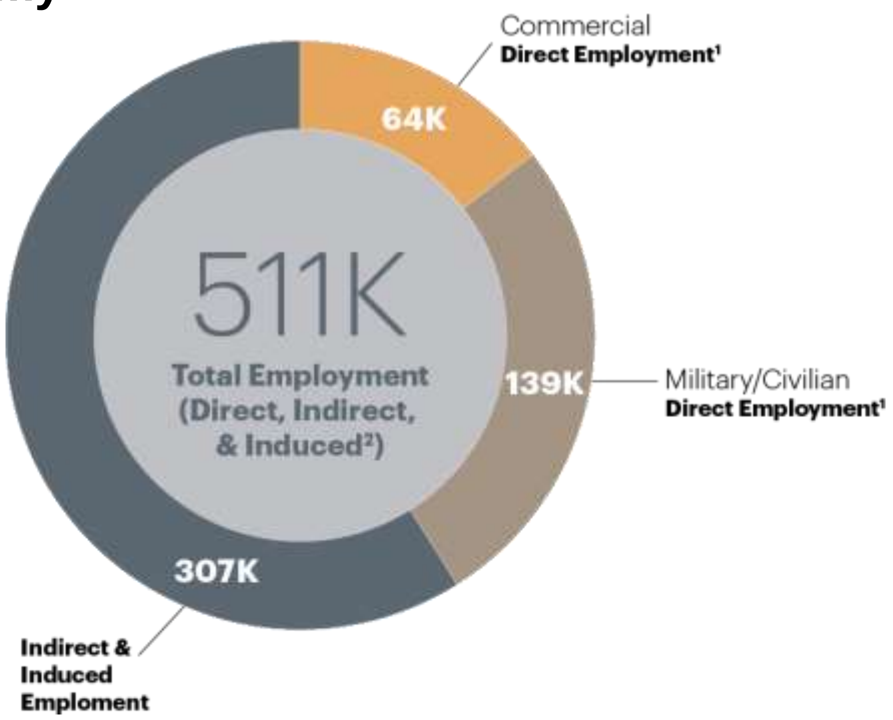
The California Aerospace industry has 203K direct employees, creating a total of 511K jobs across industries

Aerospace Industry Employment Contribution to California Economy



Key Insights

- Total of 203,000 direct jobs created by the California Aerospace market (includes Commercial, Military, and Civilian employment)
- Total of 511,000 direct, induced, and indirect employment created by the California Aerospace market
- Other industries impacted include: Finance, Real Estate, Construction, and Transportation/ Warehousing, and others

Total employment of 511K generates $2.9B of California personal income tax revenue

1. Military employment includes uniformed personnel only; Civilian includes aerospace employment at military installations NASA centers and JPL; average revenue per commercial employee is $386K, excluding DirecTV
2. 2. Induced and indirect wages and employment derived by using RIMS II multipliers from U.S. Bureau of Economic Analysis

Source: US Bureau of Economic Analysis; Bureau of Labor Statistics; navair.mil; uscg.mil; af.mil; A.T. Kearney analysis

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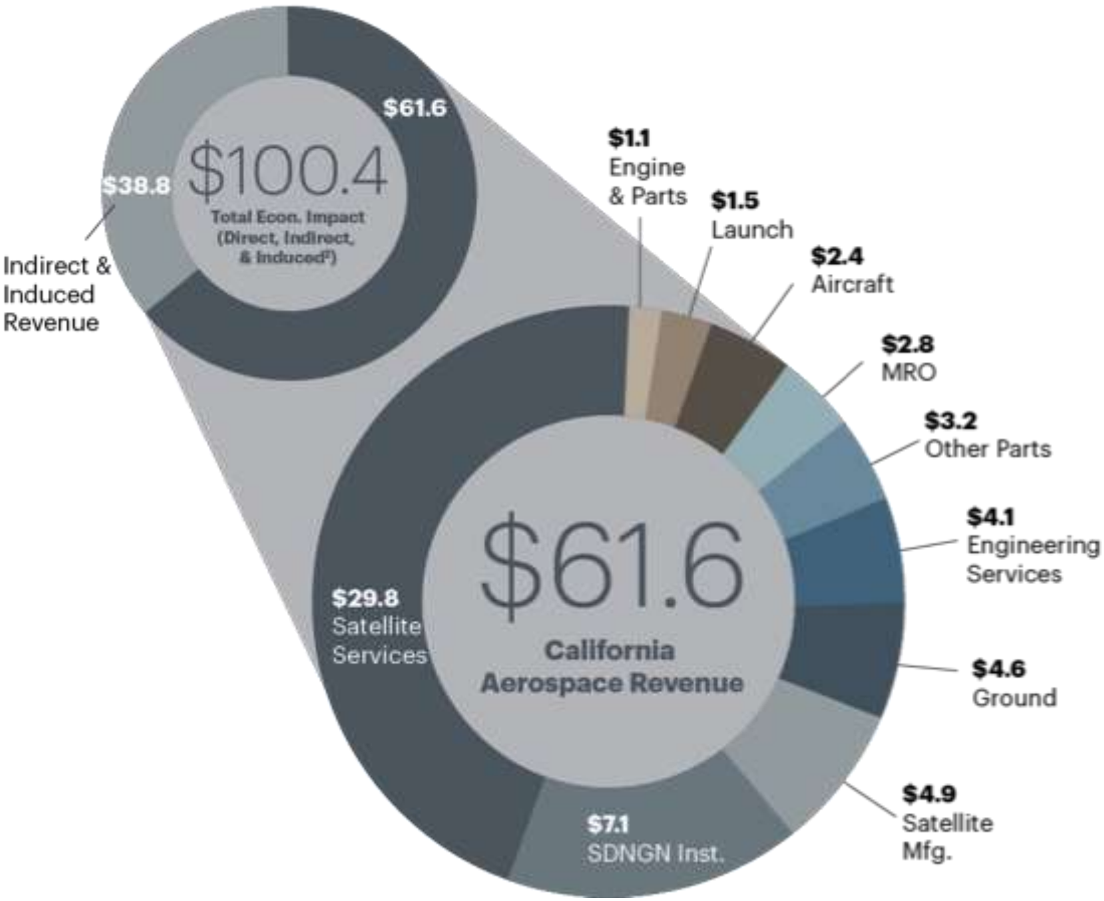
The California Aerospace industry revenue is equivalent to the Agriculture and Arts & Entertainment industry combined

Aerospace Industry Economic Contribution to the California Economy ($B)



1. Total economic impact is defined as all output/ activity generated by space industry across relevant industries' products and services. Total impact based on RIMS II multipliers from U.S. Bureau of Economic Analysis. Total Impact excludes revenues earned by California companies for work performed outside the state (primarily in the Satellite Services markets)
2. CA Gov. Office; Biotech Industry Organization: Bioscience Economic Development

Source: US Bureau of Economic Analysis; A.T. Kearney analysis

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California continues to enjoy several sources of competitive advantage; however, the industry faces competitive challenges

California Aerospace Industry Competitiveness Framework

	Commercial Climate	Intellectual and Political Climate
Ecosystem Capabilities	**Supply and Demand Base** • Manufacturing base remains strong but competition from abroad is a major long-term threat • The in-state customer base is declining as government contracts are curtailed ***Threatened Advantage – Stable Trend***	**Academic, R&D, and Workforce** • Capable and skilled workforce throughout the state • Numerous technical universities provide a pipeline to the industry ***Advantage - Worsening Trend***
Cost of Doing Business	**Cost Competitiveness** • Assembly Bills 93 and 927 provide tax incentives but lags other states • Cost remains a challenge as high tax rates and costs of living discourages investment • Wages in competitive states are beginning to equalize ***Disadvantage - Improving Trend***	**Ease of Doing Business** • Tight environmental controls remain • Difficult regulatory environment • Political indifference toward the industry is slowly improving with increased Congressional and State Assembly support ***Disadvantage – Stable Trend***

- ***California continues to enjoy several sources of competitive advantage*****:** companies with a strong global position, a highly skilled workforce, leadership of major segments, and a concentrated ecosystem of companies that enable opportunities for innovative collaboration
- ***However, the industry also faces some competitive challenges and weaknesses*****:** anticipated decrease in government spending, tax and regulatory constraints, a rising cost of living for the workforce, and a high real estate cost that deters commercial investment

Source: AIA; CaliforniaNewsWire; Press-Telegram; A.T. Kearney 2013 CA Aerospace Economic Impact Survey

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Other states have used aggressive tax incentives and marketing approaches to attract the Aerospace industry

State Comparison – Taxes and Wages

● Strong ○ Weak

State	Corporate Income Tax[1]	Personal Income Tax[1]	State Business Tax Climate Ranking	Aerospace Average Annual Wage	Cost Competitive-ness	Ease of Doing Business
Texas	1%	None	9	$90,247	●	●
Washington	3.3%	None	6	$97,040	●	◕
S. Carolina	5%	7%	36	$76,887	◕	◕
Florida	5.5%	None	5	$78,344	◕	◑
Kansas	7%	6.45%	26	$72,705	◑	◑
Georgia	6%	6%	34	$79,647	◑	◑
Alabama	6.5%	5%	21	$78,402	◔	◑
California	8.84%	12.3%	48	$101,192	○	◔

California is one of the most expensive states for Aerospace firms to conduct business

1. Represents statutory tax rates

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The California State Legislature can take several steps to support and help grow the California Aerospace industry

Recommendations

- Develop economic policies that are competitive with other states to incentivize commercial investment in California
  - Tax policies
  - Industrial development policies
- Streamline regulatory constraints and provide tax incentives at the state-level
- Lobby at the Federal level for additional share of government funded work
- Invest in STEM[1] within schools and universities; attract and retain talent
- Offer guidance for managing environmental hurdles specific to California

1. Science, technology, engineering, and math

Source: Aerospace in Southern California still strong despite C-17 and other losses, Daily Breeze

Chapter I

California Space Industry Economic Impact Study

Content

- **Space Industry Overview**
- Economic Impact of Space Industry

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Global and U.S. Space Industry Trends

Key Global Trends

- The number of commercial players and national space programs promoting commercial investment are on the rise
- Competition remains strong between United States, European, multinational, and Russian providers, while new entrants are joining, re-joining, or advancing toward the commercial launch market
- Globalization is rising through foreign direct investments and international trade, especially in high-technology products and services
- Brazil, Russia, India, China, and other countries are increasingly exporting space technologies
- Global demand for satellite services continues to be strong, led by substantial growth in Asia and solid growth in the Middle East
- Public sector customers globally remain essential as investors in institutional science missions and other space R&D
- Over the next five years, growth is likely bolstered by the digital economy and the telecommunications industry

Key U.S. Trends

- With the 2010 National Space Policy, the U.S. government has placed less focus on national security space concerns and more emphasis on developing commercial space capabilities
- New US players such as SpaceX and Orbital have positioned themselves aggressively in the commercial launch market
- Sequestration and lower Federal budgets have destabilized the industry, at least in the short run:
  - An estimated $500B reduction in defense spending over the next decade will slow investment and hiring
  - Reductions in R&D pose challenges in maintaining technological leadership
- A shortage of aerospace and defense scientists and engineers from 2005-2020 is a threat to national competitiveness
- U.S. strengths in digital and telecommunications industries represent opportunities for future growth

Source: The Space Sector in 2011 and Beyond; Commercial Space Transportation: 2011 Year in Review; The Aerospace Industry in Southern California; State of the Satellite Industry Report June 2013; NASA 2012 Year End Review & Forecast; FAA 2012 Forecast; A.T. Kearney analysis; Aerospace Industries Association

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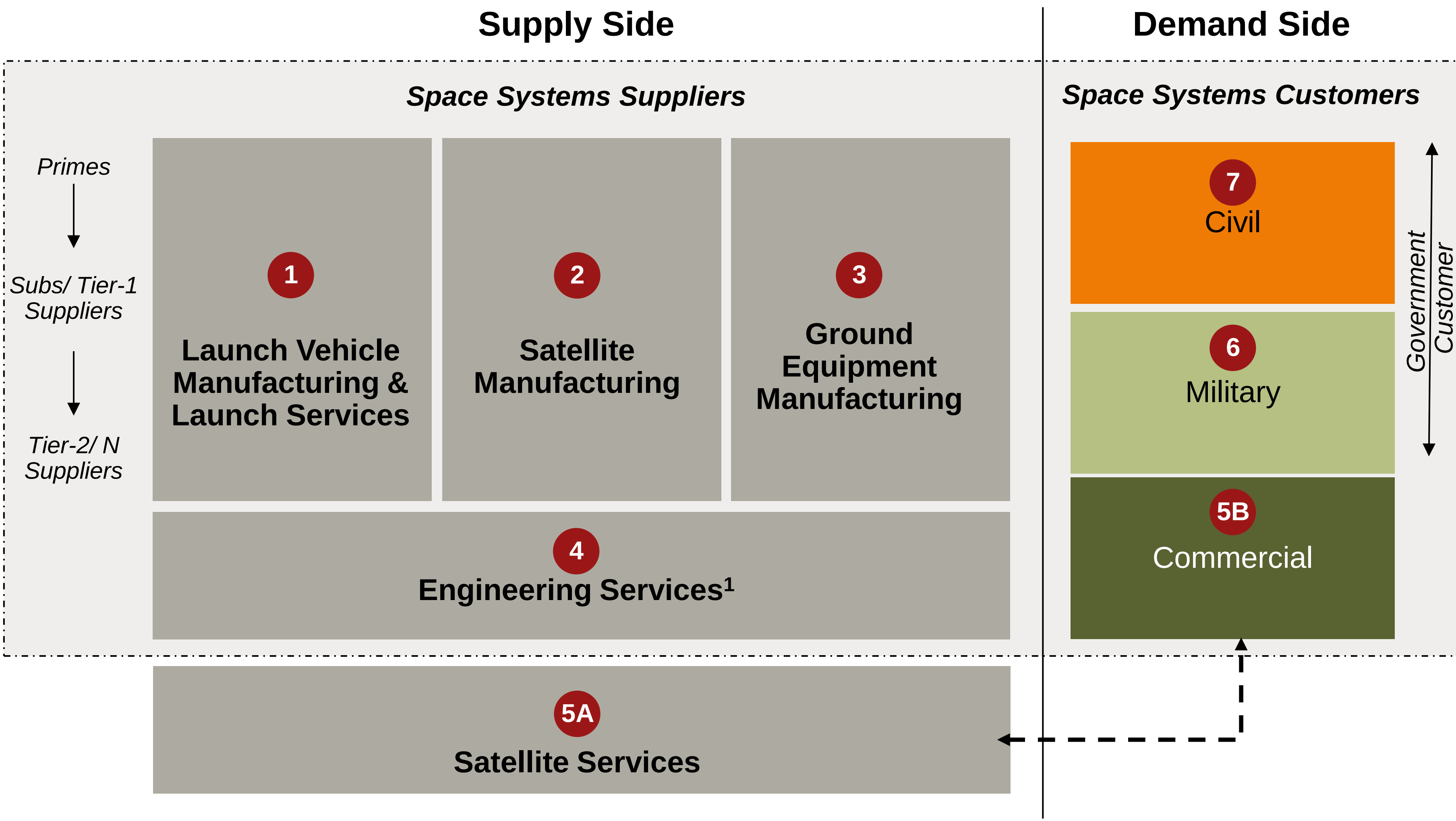
Space Industry Supply and Demand Equation



1. Engineering services include directly awarded SE&I, SETA, Software, Testing & Verification, and On-going Operational Support contractors; it is exclusive of and in addition to potential similar services that may be covered and bundled in prime contracts

Source: A.T. Kearney analysis

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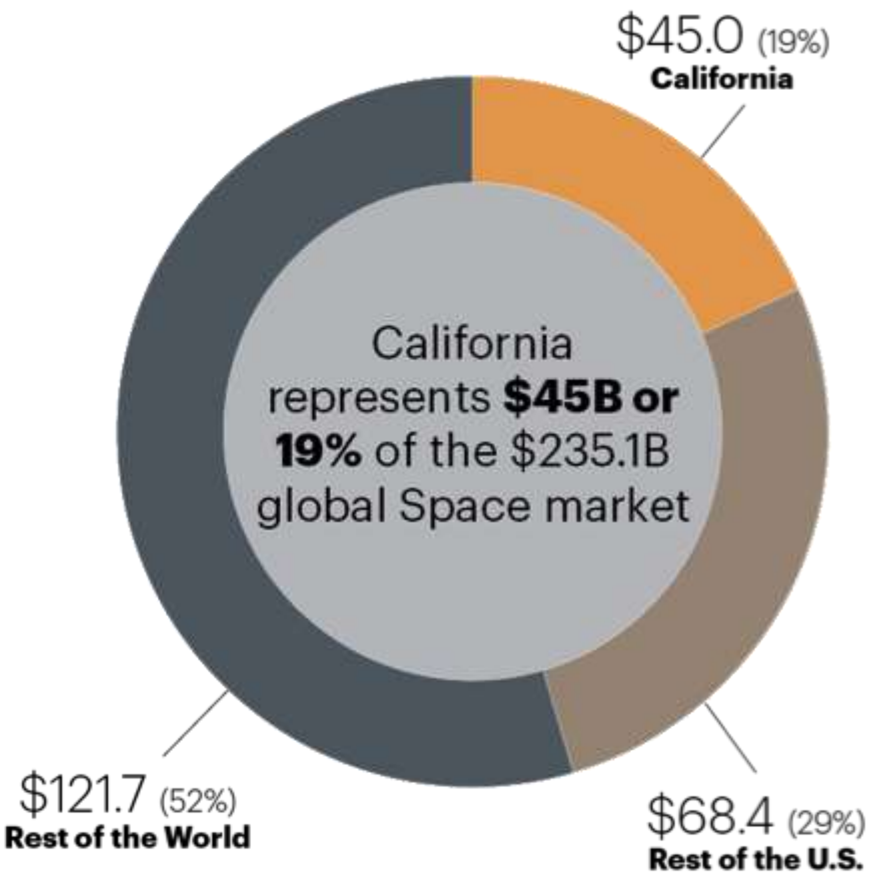
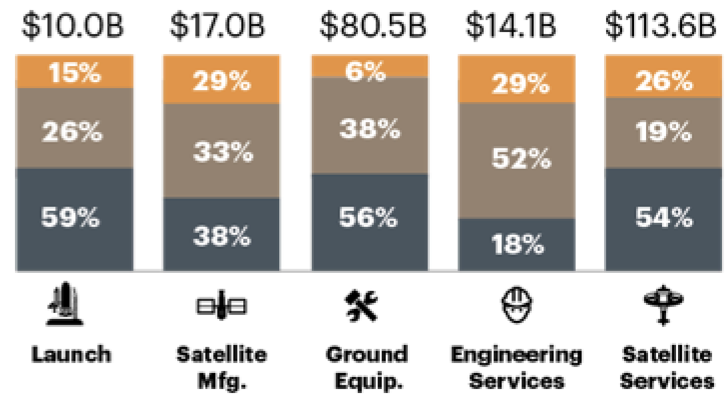
California holds 19% of the global Space market, with leading positions in satellite manufacturing & engineering services

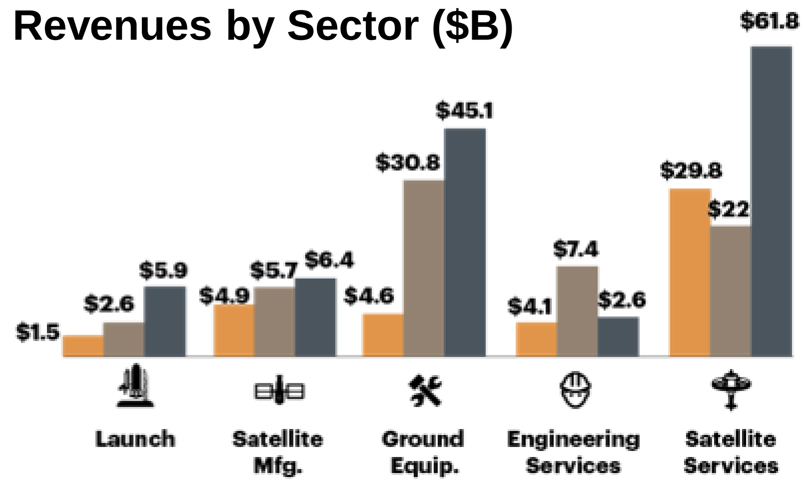
Market Share by Geography ($B,%)



Market Share by Sector (%)



Revenues by Sector ($B)



Source: 2012 SIA State of the Satellite Industry; company annual reports; OneSource company data; FAA; European GNSS Agency 2012 & 2013; Department of Defense and NASA contract database; A.T. Kearney analysis

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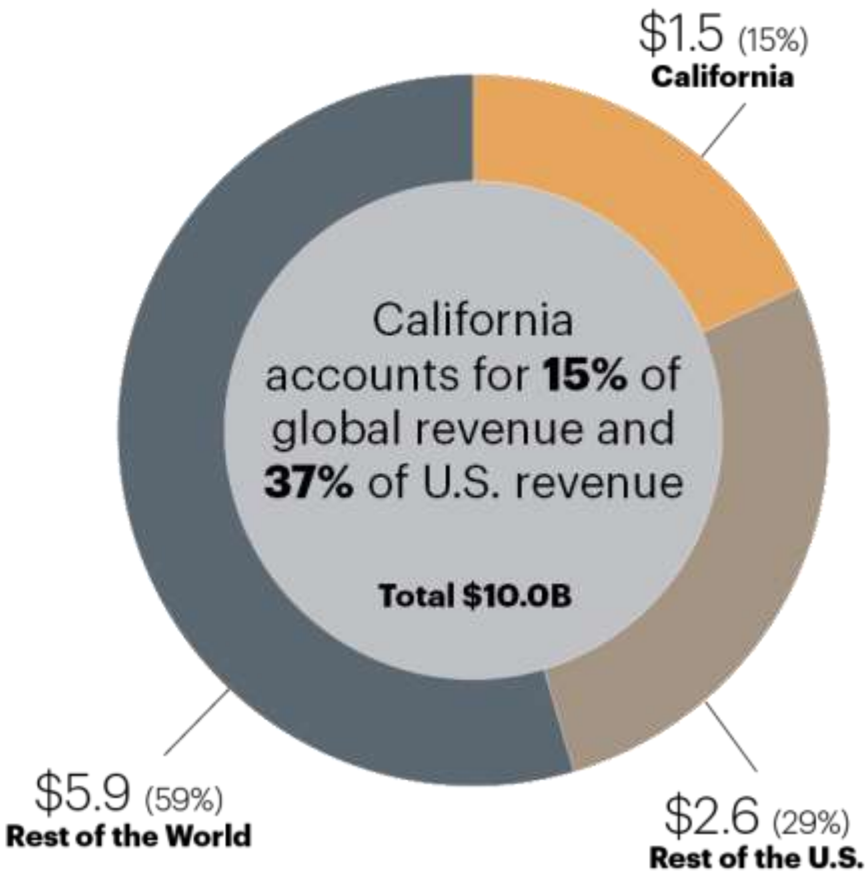
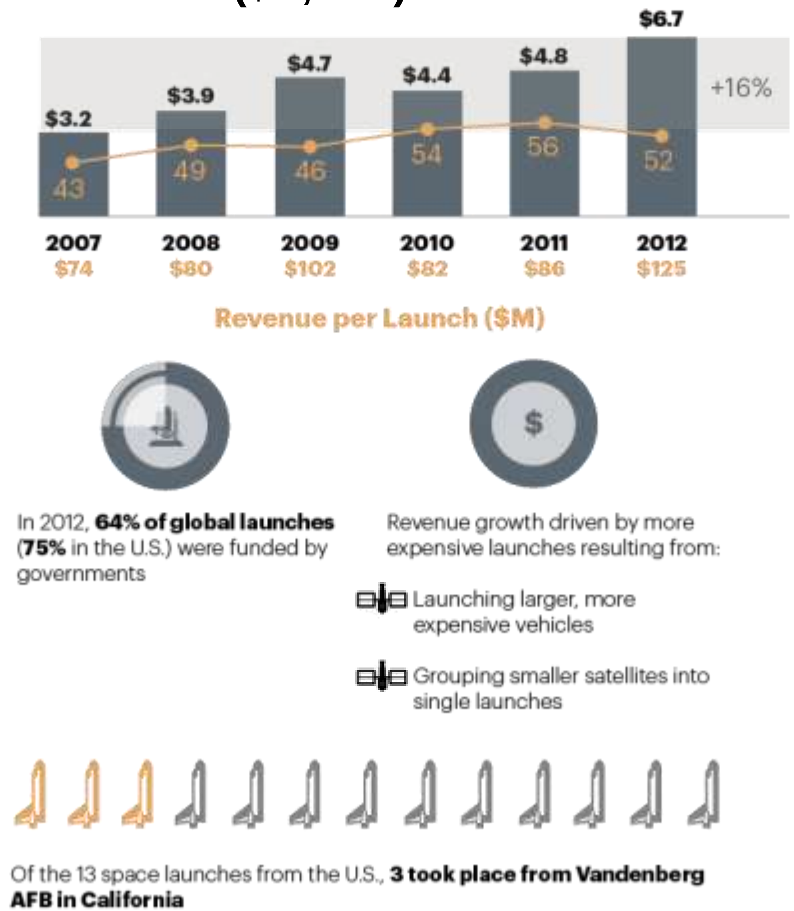
California has 15% share of the growing Global Launch industry

2012 Total Global Market Share by Geography ($B,%)[1]



Global Commercially-Procured Launches and Revenue ($B, No.)



1. California share driven by launch services and launch vehicle manufacturing

Source: Satellite Industry Association; FAA; Space Flight Now; The Space Report; A.T. Kearney analysis

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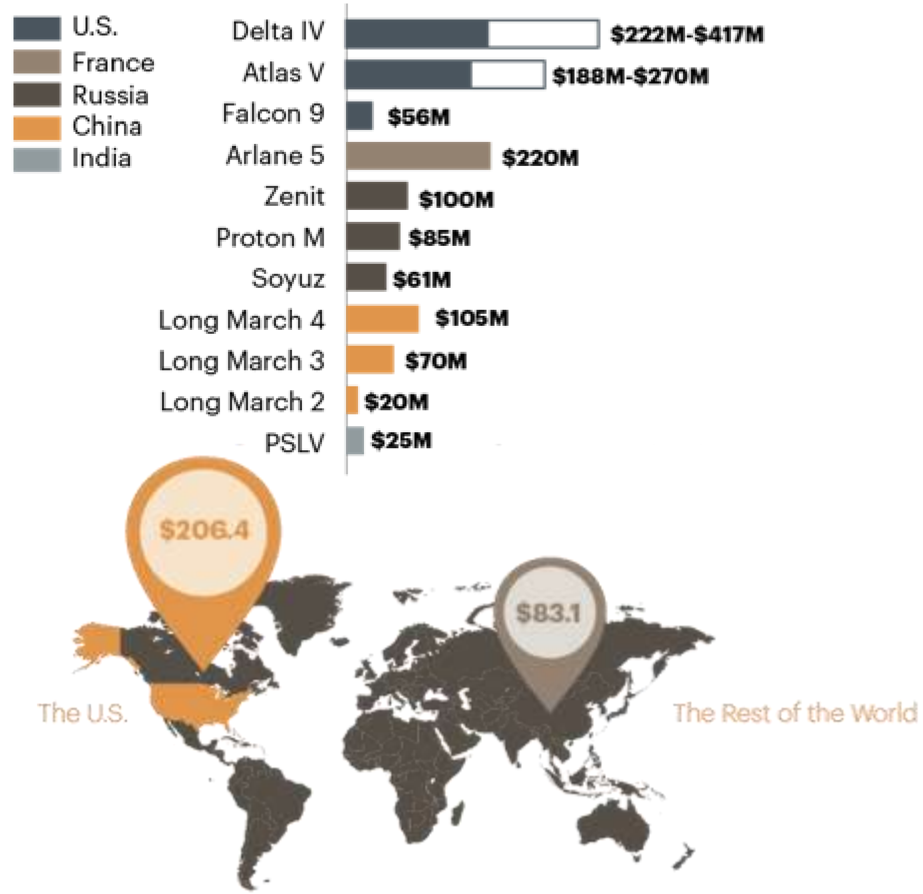
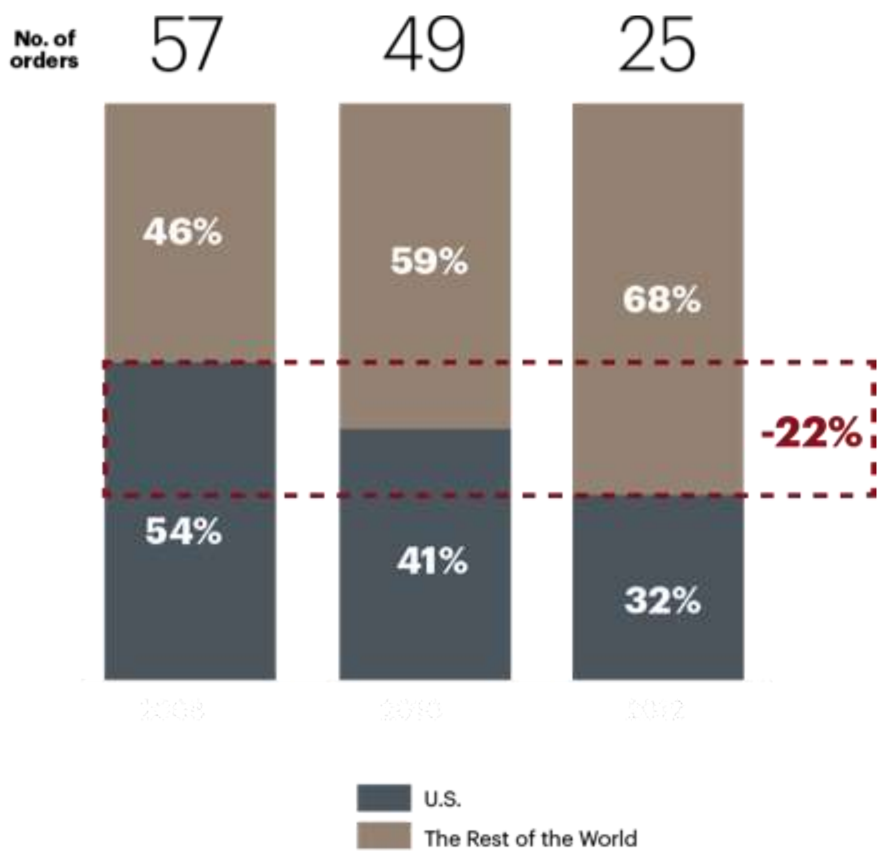
The U.S. is losing market share in commercial launch orders to lower cost international competitors

Cost per Launch Vehicle by Geography[1] ($M)



Share of Orders Won by Geography (%)



1. Delta IV and Atlas V launch costs vary upon configuration (e.g., number of solid rocket boosters (SRB's)) and costs include an allocation related to Expendable Launch Capability contract with ULA

Source: Satellite Industry Association Oct 2013, 2010 and 2008; NASA; FAA 2012 Report; A.T. Kearney analysis

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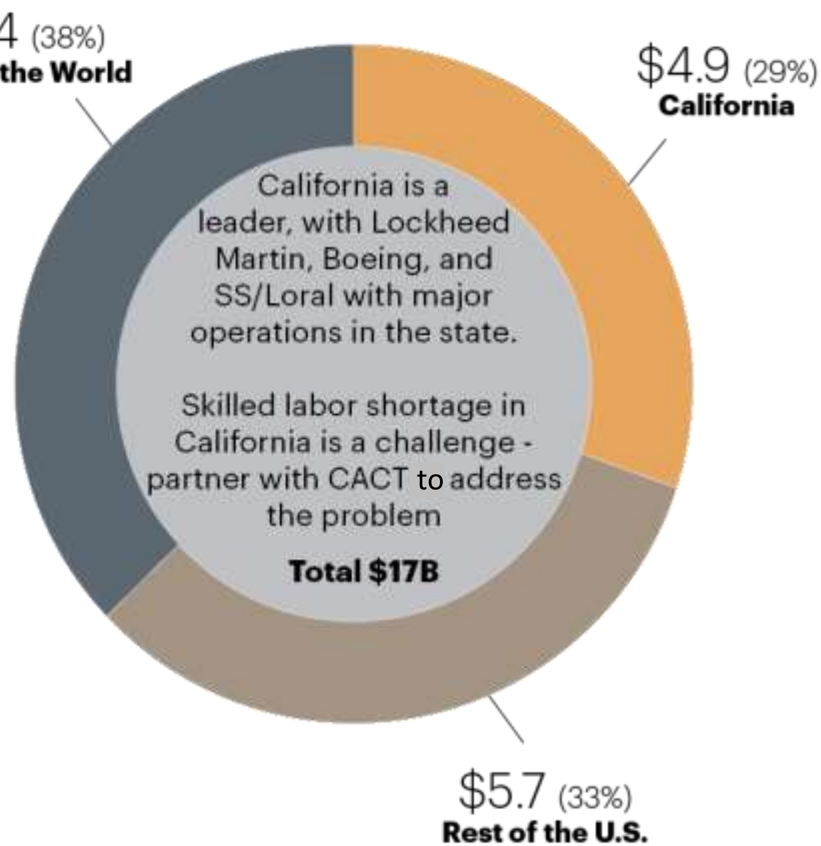
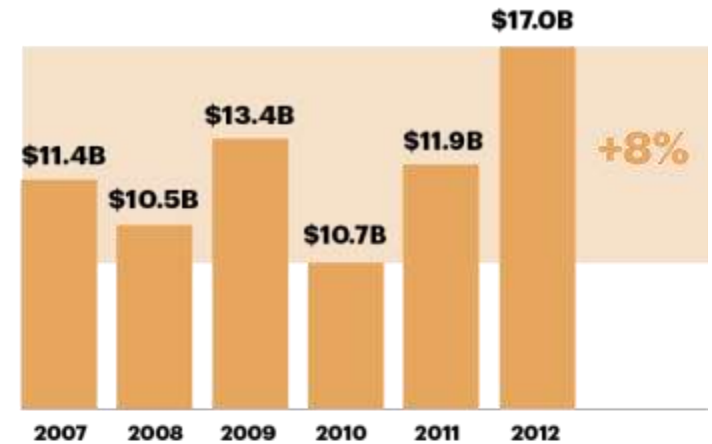
California is a leader in Satellite Manufacturing, claiming 29% of a $17B global market

2012 Global Satellite Manufacturing Revenues ($B,%)[1]





- Proliferation of digital content, HDTV, DTH TV, etc. is driving commercial satellite manufacturing demand
- Removal of commercial satellites from TAR export controls in 2013 should help international sales[3]
- International competition, particularly from the European Union and Russia, is increasing – multi-national JVs are being formed to better compete in Russian and international markets[4]
- Growth in microsatellites is expected

1. Adjusted figures include estimate of classified DOD spend and the U.S. government's budgeted amounts for scientific & research satellites
2. CACT stands for Centers for Applied Competitive Technologies through California Community College's Economic & Workforce Development program
3. ITAR stands for the International Traffic in Arms Regulations administered by the U.S. Department of State
4. Russia is beginning to adopt the U.S.'s exacting standards to compete on U.S. soil in the future

Source: Satellite Industry Association; Flight Global; Space News & FAA; Company annual reports; FY13 DOD & NASA Budget Requests; A.T. Kearney analysis

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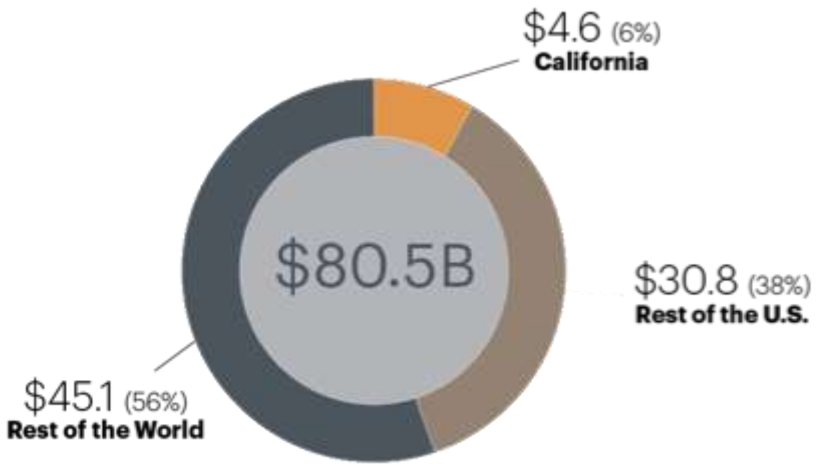
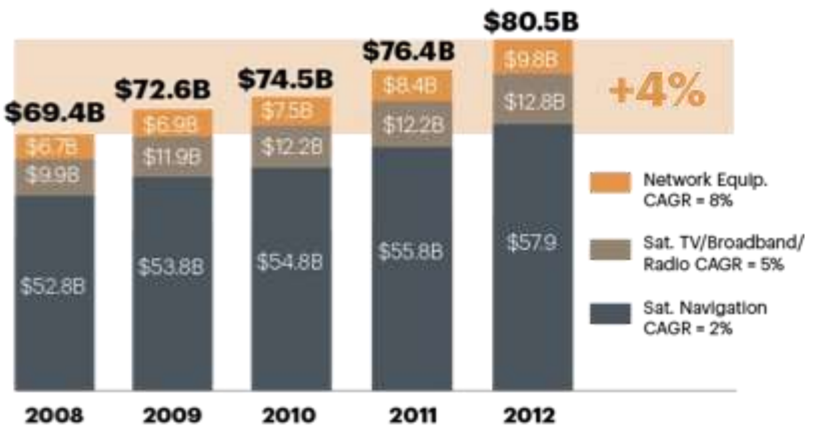
California has 6% ($4.6B) share of the global Ground Equipment market

2012 Market Share by Geography ($B, %)



Global Ground Equipment Revenues ($B)[1]



Trends by Segment

- **Network Equipment** segment has grown the quickest (8% CAGR 2008-12), driven by demand for very small aperture terminals (VSATs)
- **Satellite TV, Radio, and Broadband Equipment** has grown at 5%, in line with consumer demand for satellite TV, radio, and broadband services
- **Satellite Navigation Equipment i**s the largest segment but has grown relatively slowly at 2% due to maturation of the personal navigation device market

Sector Outlook

- Key California players include: ViaSat, Sanmina, Trimble Navigation, Broadcom and Qualcomm[2]
- The consumer navigation segment is projected to grow rapidly, with key areas of opportunity in sales of devices with location-based services (LBS)
- California's role will be increasingly important due to the growth in LBS, with players such as Google, Apple, Qualcomm, Broadcom, and app developers

1. Revenue analysis includes value of chipsets that enable navigation or other location-based services within devices, such as smartphones
2. California share based on analysis of relevant NAICS industry data by geography

Source: Satellite Industry Association 2012 & 2013; Bloomberg; Comsys Report 2010; European GNSS Agency 2012 & 2013; One Source; A.T. Kearney analysis

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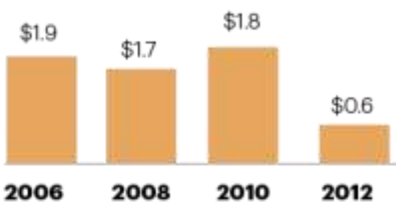
The U.S. government drives spending on engineering services to support on-going operations and develop advanced systems

External Engineering Services Spend[1]

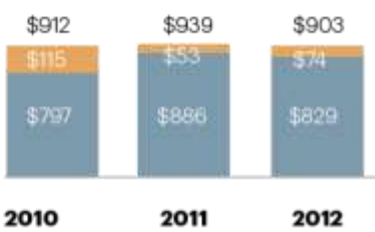
United Space Alliance (USA)
Annual NASA Contract Oblication to USA ($B)



USA, once the largest NASA contractor and responsible for Space Shuttle operations, has seen revenue fall off since the Shuttle was retired in 2011

- The DOD is a major buyer of space systems and engineering services, partnering with firms that provide project oversight and technical expertise
- The vast majority of NASA's services spend supports on-going space operations, scientific research, and development of next-generation manned space technologies. In California, these services go toward unmanned space exploration at JPL and technical scientific research at Ames & Dryden Research Centers
- The U.S. military and civil spend is nearly 4.5 times more than European spend on space engineering services

The Aerospace Corporation[2]
Aerospace Corp Annual Revenues



The Aerospace Corporation works side-by-side with the DoD & Civil agencies to provide launch verification & engineering support for launch, space, and related ground systems

1. Engineering services include directly awarded SE&I, SETA, Software, Testing & Verification & On-going Operational Support contractors; it is exclusive of and in addition to potential similar services that may be covered and bundled in prime contracts. Satellite support and engineering services for commercial satellite operators is a small market, and is included in the Satellite Services and Ground Equipment categories.
2. The Aerospace Corp is a Federally Funded Research & Development Center (FFRDC) that conducts launch verification and research for the U.S. government

Source: Eurospace; Department of Defense and NASA contract database; Aerospace Corp Annual Reports; A.T. Kearney analysis

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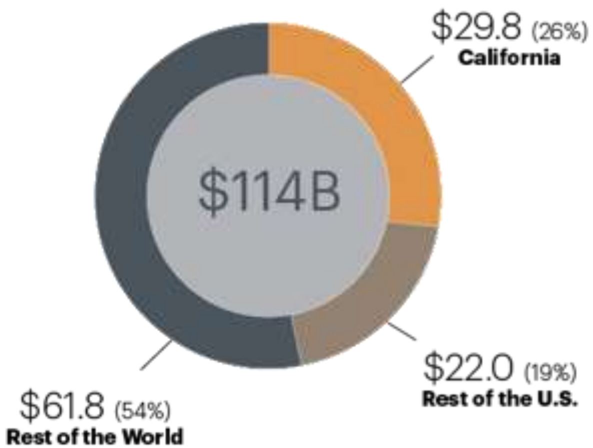
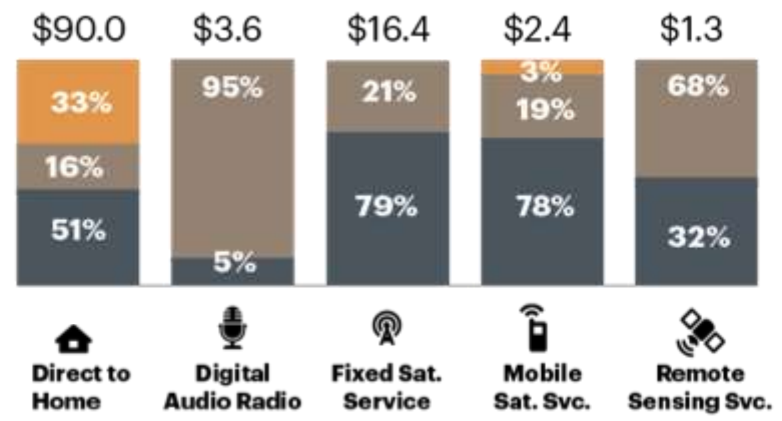
California has captured $30B (26%) of the $114B global Satellite Services market

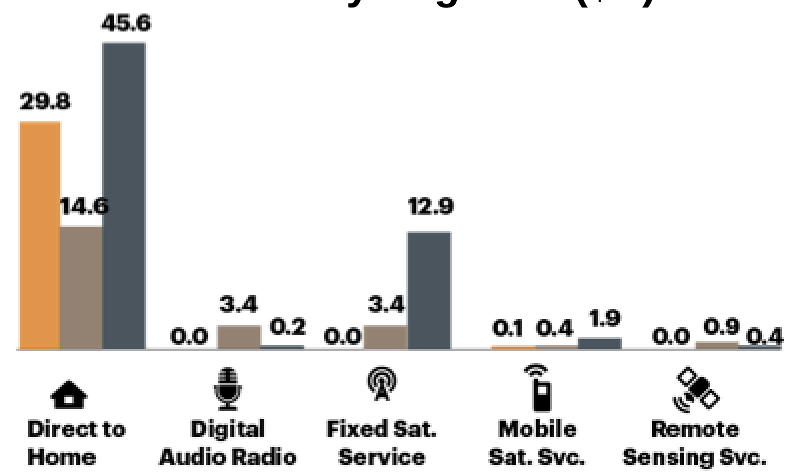
2012 Market Share by Geography ($B, %)



2012 Market Share by Segment ($B, %)



2012 Revenues by Segment ($B)



Sector Outlook

- Direct to Home is the largest contributor to the market
  - Direct to Home was $90B (80%) of global revenues
  - $29.7B (33% of satellite TV revenues) are attributed to DirectTV in El Segundo, California[1]
- Overall the satellite services sector grew by 5% from 2011, consistent with consumer demand, with the highest growth in remote sensing (20%) due to the U.S. government spend
- Other California players include ViaSat (mobile satellite services)

1. All of DirectTV's revenue is allocated to California

Source: SIA; Company annual reports; Bloomberg; Daily Finance; A.T. Kearney analysis

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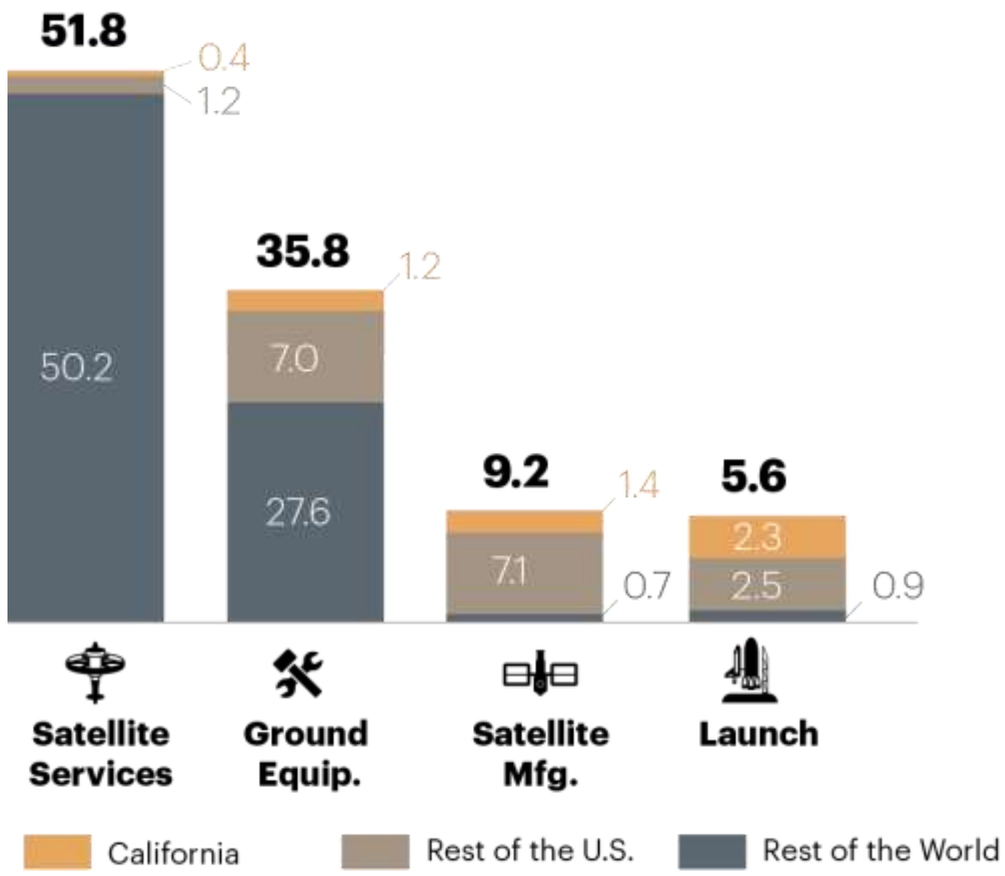
Business and consumer demand amounted to $79B (70% of total demand), with Satellite Services as the largest contributor

2012 U.S. Demand ($B)



Satellite Services and Ground Equipment

- Satellite services demand includes:
  - 30MM DirecTV subscribers
  - 23.9MM Sirius XM subscribers
- Ground equipment demand includes:
  - Equipment for satellite services companies
  - Personal navigation and LBS-enabled devices

Satellite Manufacturing

- U.S. Satellite Services operators launched 8 U.S.-manufactured satellites into orbit in 2012
- Examples include:

Date	Operator	Type	Prime Manufacturer
Mar ‘12	Intelsat	GEO	Boeing Satellite Systems
July ‘12	Hughes Network Systems	GEO	Space Systems/Loral
Aug ‘12	Avanti Screenmedia	GEO	Orbital Sciences Corp.
Nov ‘12	EchoStar	GEO	Space Systems/Loral

Launch

- U.S. customers had 19 launches in 2012, with an average cost of $146M per launch
- 7 of those launches used non-U.S. launch vehicles

Source: FAA 2012 Launch Report; Space News; Interviews; SEC filings; A.T. Kearney analysis

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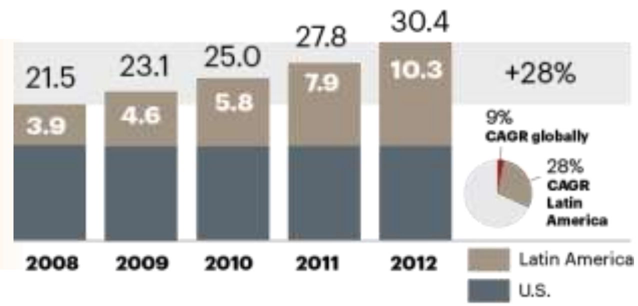
Consumer demand has driven growth across satellite and satellite-enabled services – in which California can play a role

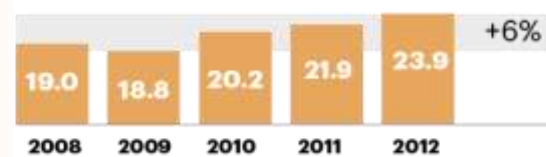
Service Type	Growth Drivers
Direct to Home (TV/ Broadband)	• DirecTV subscriber growth in Latin America (28%) drives growth, despite competition from Internet TV and cable • Dish made modest subscriber gains in 2012, but seeks growth with wireless network launch
Digital Audio Radio Services	• Strong growth from Sirius XM driven by recovery of the U.S. auto industry and tied to new car sales • Sirius XM will face competition from Apple and Pandora for the in-car market
Location Based Services (LBS)	• Aggressive growth of LBS driven by proliferation of smart phones and other enabled devices • These devices, along with the mobile app market, have contributed to the decline of personal navigation devices

Selected Growth Trends

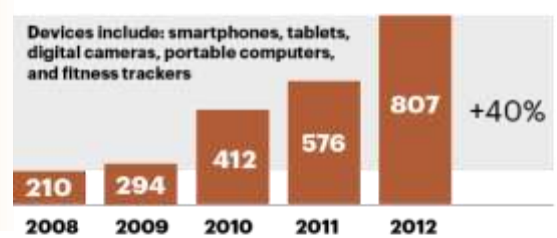
DirecTV Subscribers (No. M)



Sirius XM Subscribers (No. M)



Global LBS-Enabled Devices (No. M)



Source: Forbes; Trefis; Daily Finance; European GNSS Agency 2013; Company annual reports

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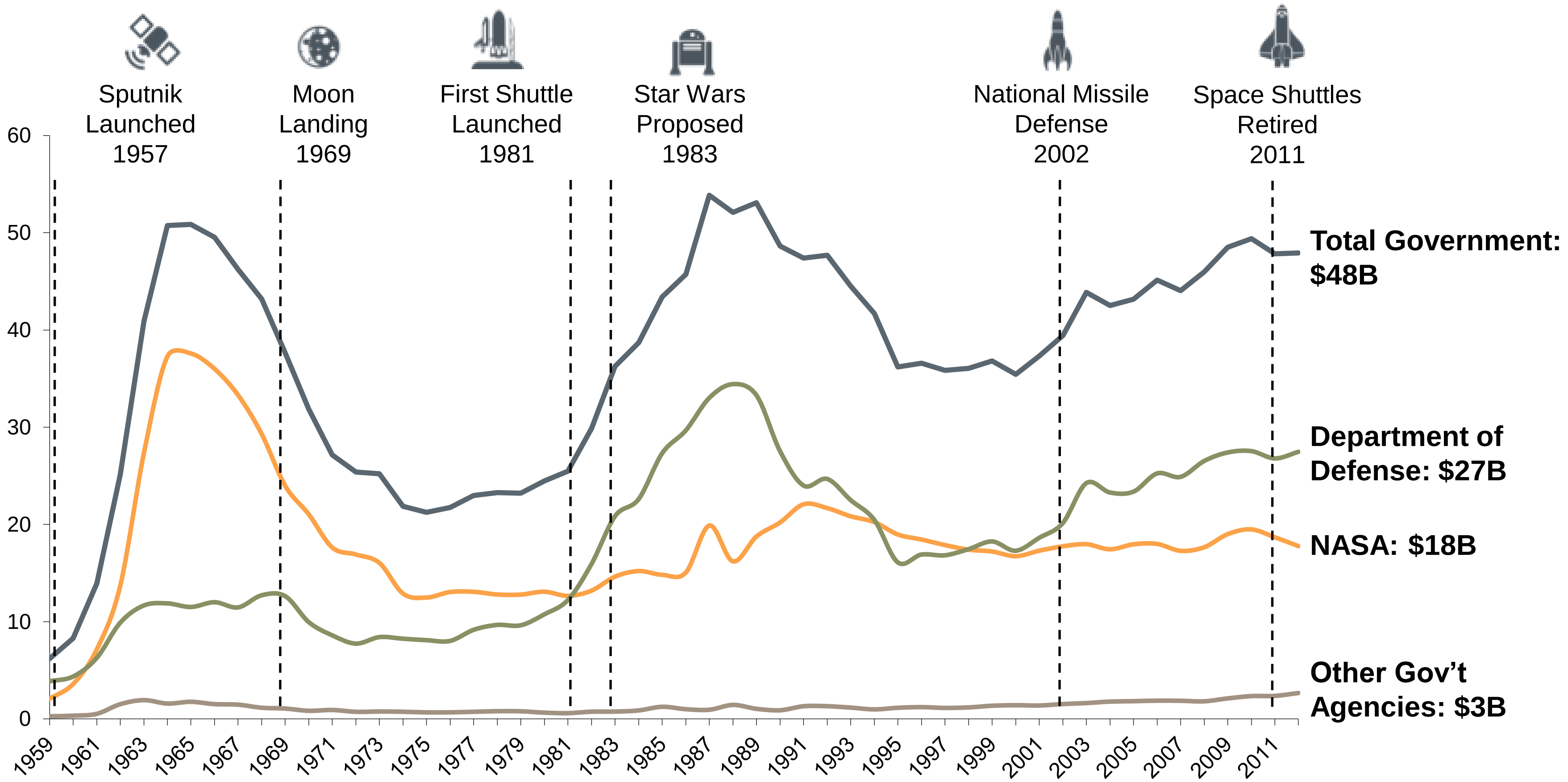
The U.S. government spends nearly $48B on space systems annually, even though the NASA budget remains flat

Annual Space Budgets of the U.S. Government Agencies ($B, Constant 2012 Dollars)



Source: Air Force Magazine 2009 Space Almanac; Space Foundation; The Space Report 2013; A.T. Kearney analysis

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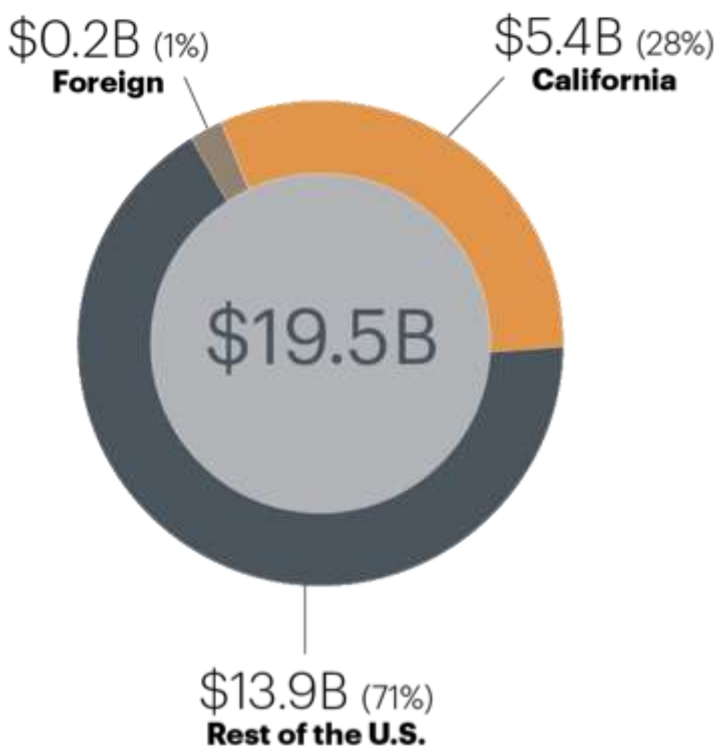
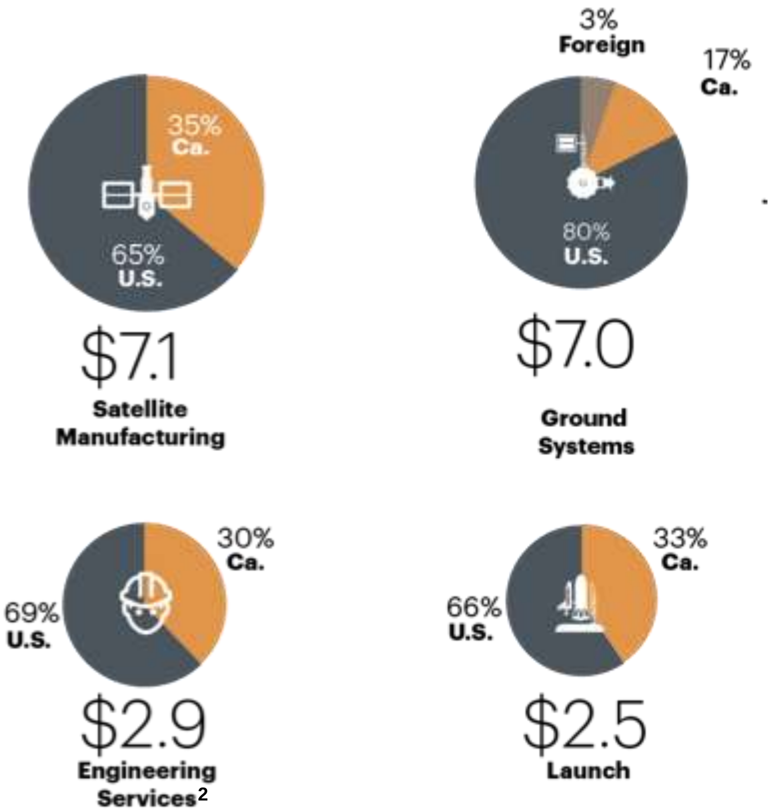
California gets 28% of Department of Defense Space spending, with a focus on Satellite Manufacturing

External DOD Space Spend ($B)
(Includes estimated classified spend)[1]



DOD Space External Spend by Category ($B)



1. Includes estimate of classified spending contained in the National & Military Intelligence Program Budgets. Uniformed military personnel costs and non-Space specific Operations & Maintenance costs (i.e. base operating funds) are not included in this total
2. Engineering services include SE&I, Software, Testing & Verification, and On-going Operational Support

Source: DOD FY13 Budget Request; DOD Contract database Space Foundation 2012 Space Report; A.T. Kearney analysis

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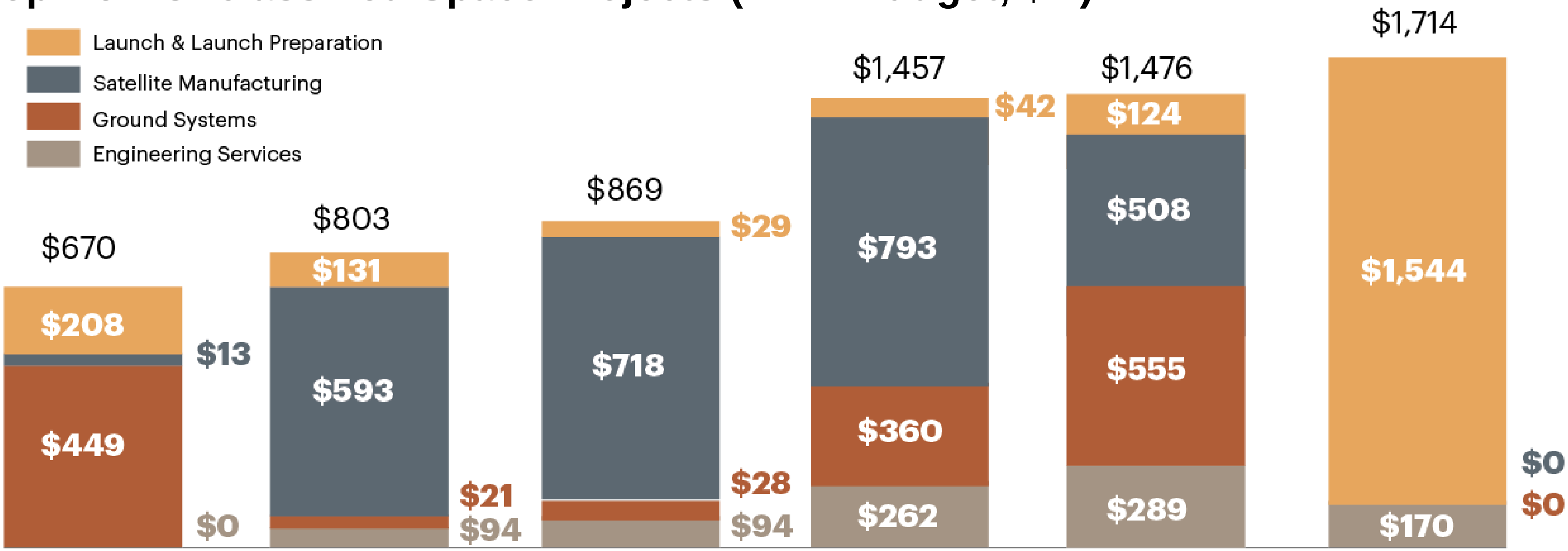
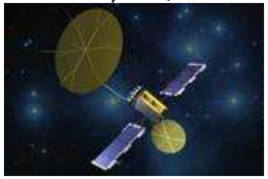
Four of the biggest Department of Defense Space programs are based in California

Top DoD Unclassified Space Projects (FY12 Budget, $M)

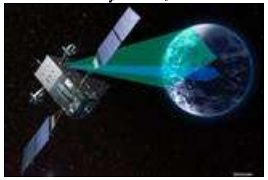


MUOS
Communications
Lockheed Martin Space Systems, Sunnyvale, CA



WGS
Communications
Boeing Defense, Space & Security, El Segundo, CA

SBIRS
Missile Warning
Lockheed Martin Space Systems, Sunnyvale, CA



GPS
Navigation
Lockheed Martin Corporation Newtown, PA

AEHF
Communications
Lockheed Martin Space Systems Sunnyvale, CA

EELV
Launch
United Launch Alliance Centennial, CO

Source: FY2013 DOD Budget Request; DOD Contract database; A.T. Kearney analysis

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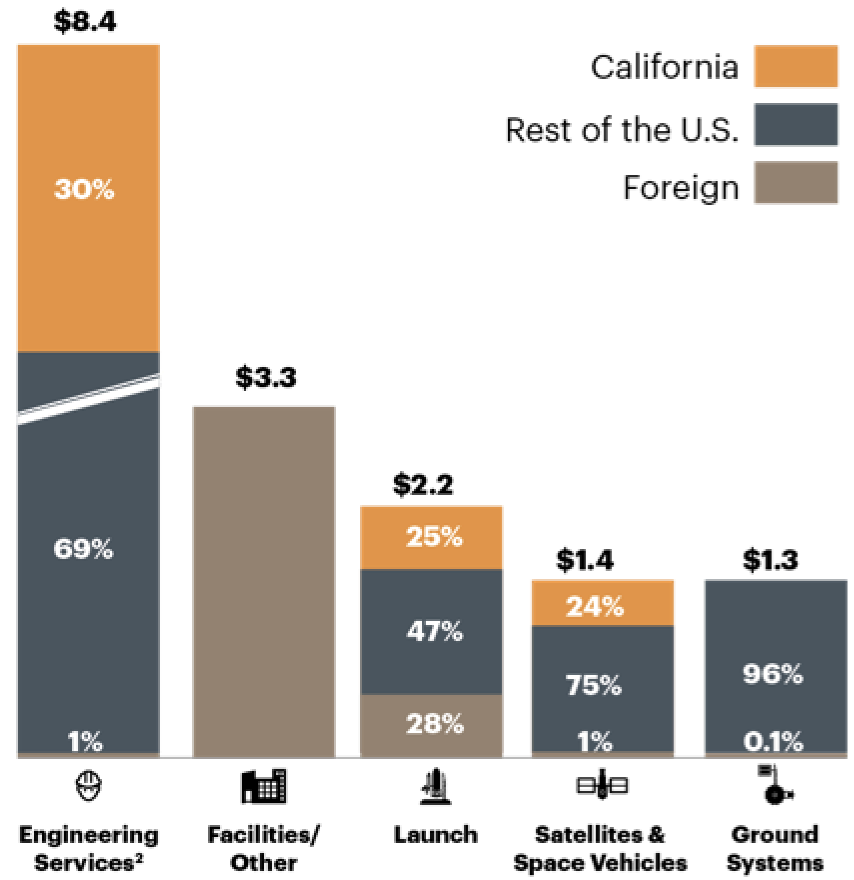
NASA's external spend mostly goes to Engineering Services including supporting ongoing space operations and research

NASA FY12 Spending by Mission ($B)[1]

Top NASA Programs ($B)

Program	FY12 Actuals
International Space Station (Space Operations)	$2.79B
Space Launch System (Exploration)	$1.50B
Orion Multi-purpose Crew Vehicle (Exploration)	$1.20B
James Webb Space Telescope (Science)	$0.53B

External Spend by Category ($B)



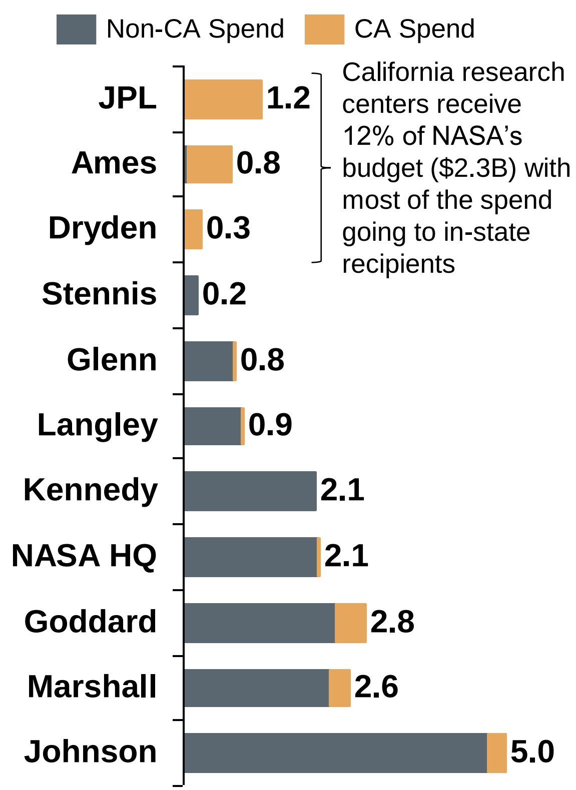
1. Total NASA spending (obligations) shown here exceed total budget appropriations due to earned revenue from other Government Agencies and Commercial partners
2. Engineering Services includes scientific research, development of next-generation manned space vehicles, and on-going operations such as the Int'l Space Station

Source: NASA FY12 Financial Report; NASA Contract database; A.T. Kearney analysis

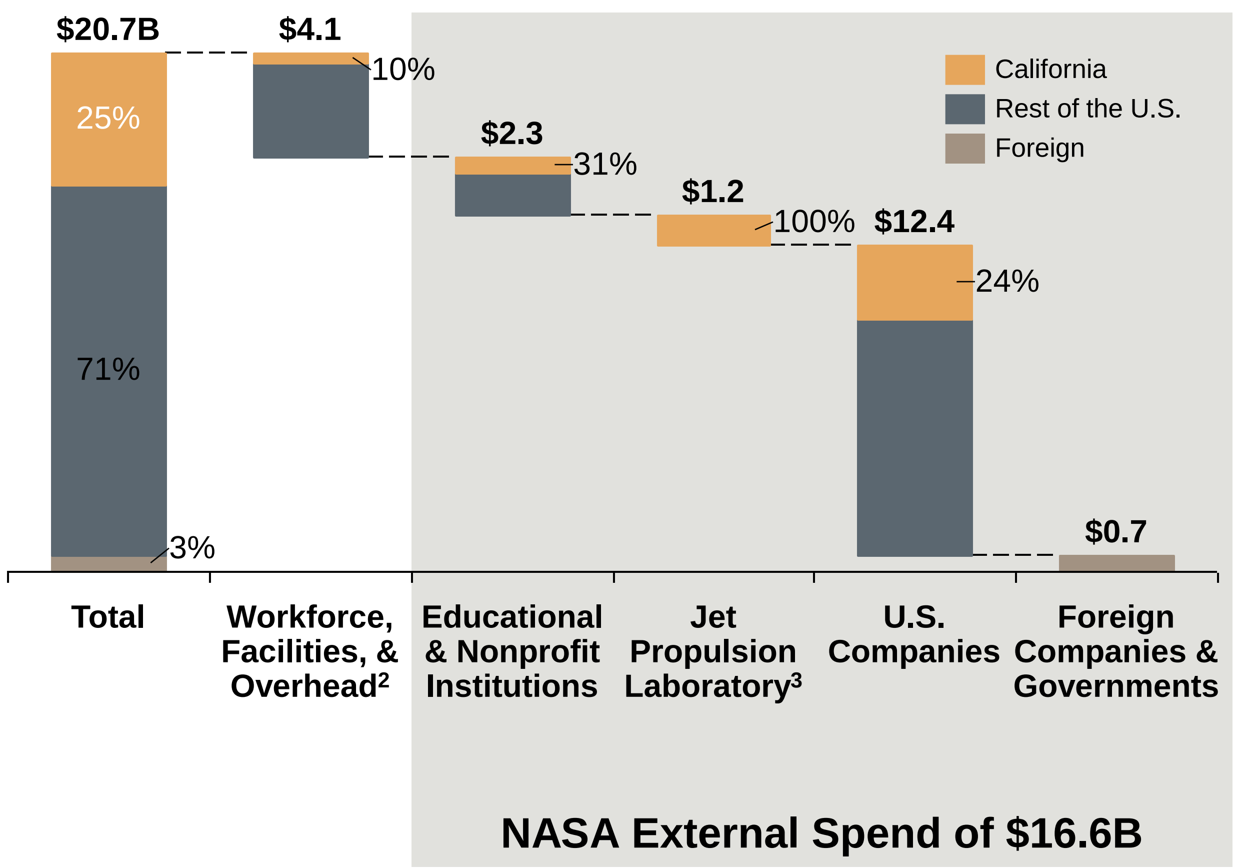
ATKearney

Although only 12% of NASA's budget goes to California research centers, the state receives a quarter of total spending

NASA FY12 Budget by Center ($B)



NASA FY12 Spending by Recipient[1] ($B)



1. Total NASA spending (obligations) shown here exceed total budget appropriations due to earned revenue from other Government Agencies or Commercial partners
2. NASA compensation, facilities, and overhead costs are allocated by workforce location, with 10% of full-time workforce located in California centers
3. Jet Propulsion Laboratory funding includes $0.7B for internal JPL costs and $0.5B for subcontracts

Source: NASA FY12 Annual Financial Report; NASA FY12 Annual Procurement Report; NASA Workforce Information Cubes; A.T. Kearney analysis

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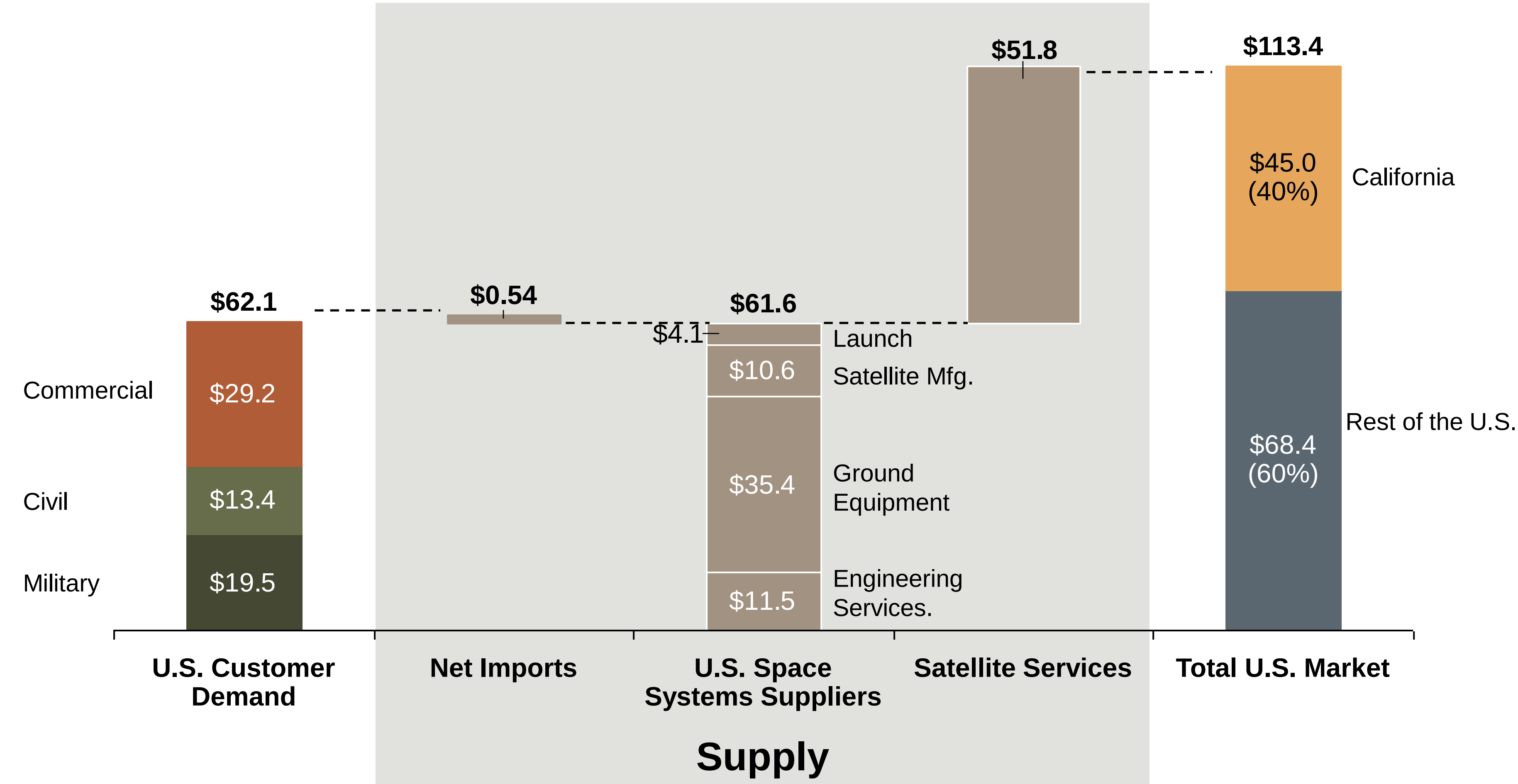
California's Space industry amounts to $45B and accounts for 40% of the U.S. market

2012 U.S. Space Industry Market Demand and Supply Equation ($B)



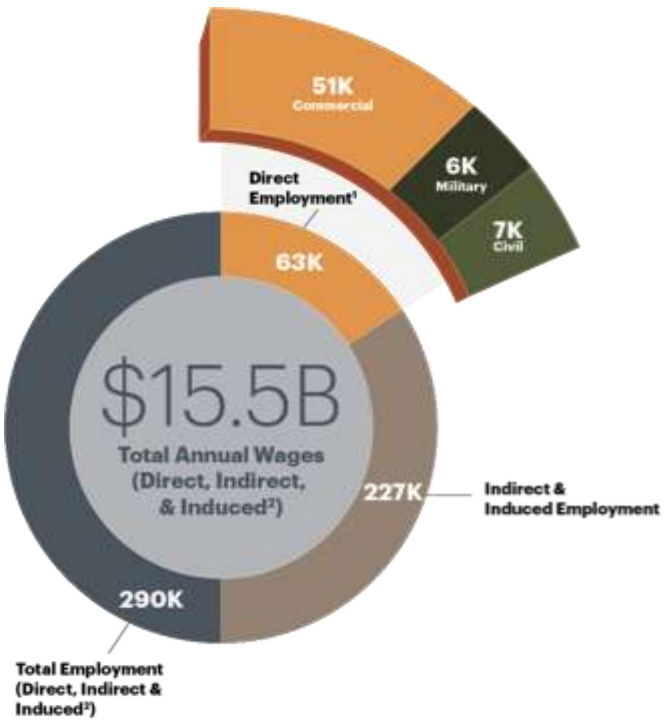
Content

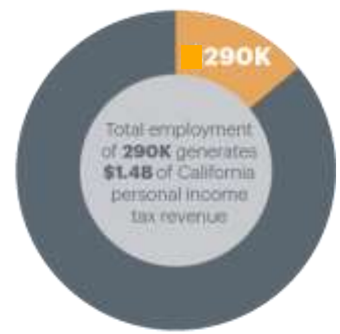
- Space Industry Overview
- **Economic Impact of Space Industry**

A.T. Kearney

The California Space industry has 63,000 direct employees and creates a total of 290,000 jobs across all industries

2012 Space Industry Employment and Wage Contribution to California Economy





Key Insights

- Higher wages for information and manufacturing sector jobs associated with the Space industry have a significant effect on the overall economic impact
- Other industries impacted include: Finance, Real Estate, Construction, and Transportation/ Warehousing, and others

Total employment of 290K generates $1.4B of California personal income tax revenue

1. Military employment includes uniformed personnel only; Civil includes employment at NASA centers and JPL. Average revenue per commercial employee is $386K, excluding DirecTV
2. Total jobs and wages based on RIMS II multipliers from U.S. Bureau of Economic Analysis

Source: US Bureau of Economic Analysis; A.T. Kearney analysis

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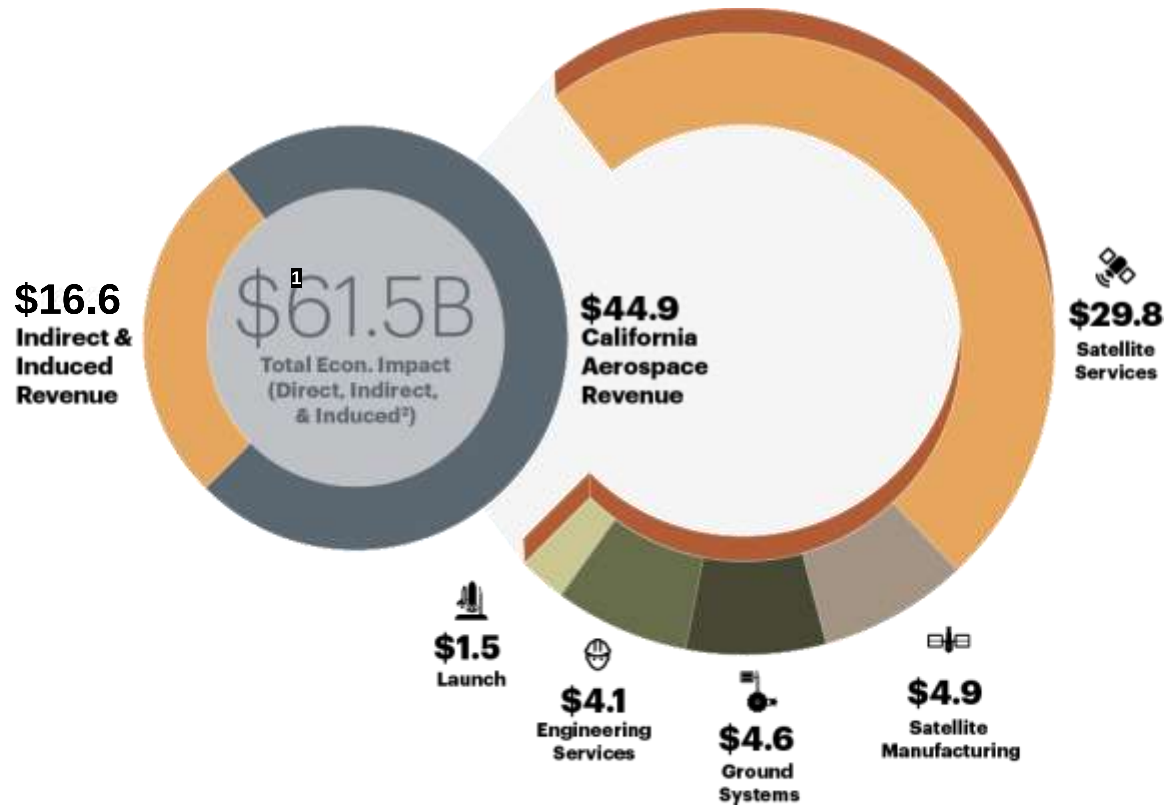
The California Space industry creates $61.5B in total economic impact from revenues of $45B

Space Industry Economic Contribution to the California Economy ($B)

Key Insights

- Total economic impact is defined as all output/activity generated by the space industry across relevant industries' products and services
- Information and manufacturing industries benefited from two-thirds of the economic impact ($39.7B)
- Other industries include: Administrative, Waste Management, Transportation/ Warehousing, Construction, and others



1. Total impact based on RIMS II multipliers from U.S. Bureau of Economic Analysis. Total Impact excludes revenues earned by California companies for work performed outside the state (primarily in the Satellite Services markets)
Source: US Bureau of Economic Analysis; A.T. Kearney analysis

ATKearney

The Space industry supports a wealth of applications vital to other sectors

Business / Telephony
- Digital voice, fax & paging
- High-speed data transfers
- Satellite internet
- Videoconferencing

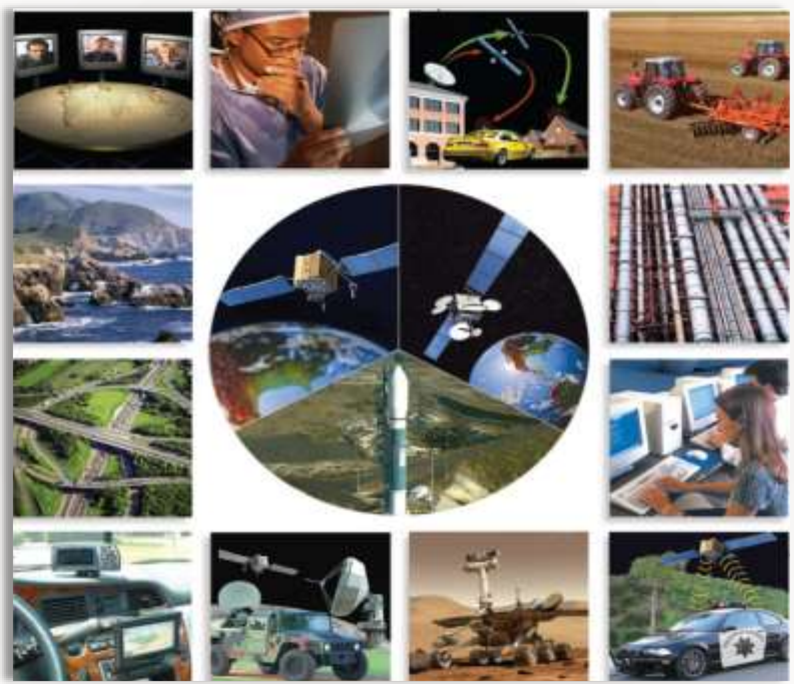
Environmental Monitoring
- Reforestation
- Watershed & vegetation management
- River & stream control
- Air pollution management
- Weather / climate

Transportation
- Marine & land navigational services
- Rail management
- Infrastructure planning
- Logistics management
- Freight security

Navigation
- Land, sea, air, and space navigational services

Medicine
- Distance diagnosis
- Rural medicine & telemedicine
- Teaching & professional development

Entertainment
- Satellite digital audio radio
- Satellite direct-to-home television
- In-flight entertainment
- News & sports



National / Homeland Security
- Intelligence data delivery & collection systems
- Diverse database linkage

Space Exploration
- Robotic missions
- Planetary missions
- Future manned missions
- Astrobiology
- Flight testing

Agriculture
- Soil analysis
- Crop moisture sensing
- Pest infestation monitoring
- Herd management

Energy Management
- Oil pipeline monitoring
- Remote meter reading
- Infrastructure management
- Resource prospecting

Education
- Distance learning
- Satellite-lined classroom and schools
- Participatory “real-time science”

Local Government
- Flood & storm watches
- Forest fire prevention
- Disaster management
- Public safety
- Crime control
- Urban planning

ATKearney

The Space industry is a spring board of innovation and new commercial products

Water Treatment Technologies Inspired Beverages

Center: Johnson

Year: 2012

Company: Unpeeled Inc.

Origin: Bioreactor concept used to grow healthy bacteria for astronauts is now used to grow strong bacteria cultures for healthy, organic juices

Cryogenic Insulation Keeps Civilians Warm

Center: Kennedy

Year: 2010

Company: Aspen Systems

Origin: NASA funding resulted in the development of a more durable insulating aerogel with commercial applications in building materials, energy, and outdoor apparel

Solar Research Advances Cell Performance

Center: Glenn

Year: 2011

Company: SPECMAT Inc.

Origin: Glenn Research Center funded the invention of a solar cell coating process that reduces production costs and increases cell efficiency and is licensing it to a company commercializing this technology

Anti – Gravity Treadmills Speed Up Rehabilitation

Center: Ames

Year: 2009

Company: Alter-G Inc.

Origin: Alter-G adapted NASA's anti-gravity treadmill technology for injury rehabilitation by using air pressure to help lower a person's body weight, reducing strain and impact

Source: NASA Spin-off database; NASA interviews; A.T. Kearney analysis

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For example, commercial applications of GPS technology have spurred innovative growth in the last two decades

1994

FAA announces GPS as the **first navigation system** approved for standalone use

1998

Vice President Al Gore announces **two new navigation signals** for civil use

1999

Benefon launches the first commercial **GPS-enabled phone**

2004

QUALCOMM (San Diego, CA) announced successful tests of Assisted-GPS system for mobile phones

2005

Germany introduces the first **GNSS road pricing system** for truck tolling

2007

Garmin doubles annual revenues to **$1.2B** from automotive sales

2009

Google (Mountain View, CA) launches free turn-by-turn navigation for the **Android**

2010

Location Labs (Emeryville, CA) releases a location-based app developer platform; telematics data standard launched for fleet management

2012

Garmin focuses on in-dash systems, shifting away from handheld devices

55.2M U.S. consumers download shopping apps, including **Wal-Mart's geo-fenced** app

2013

United Launch Alliance launches the fourth satellite in the U.S. Air Force's **new series of Global Positioning System** satellites

2015

GPS and GPS-enabled devices projected to grow at **15% CAGR to 1.01B units** globally

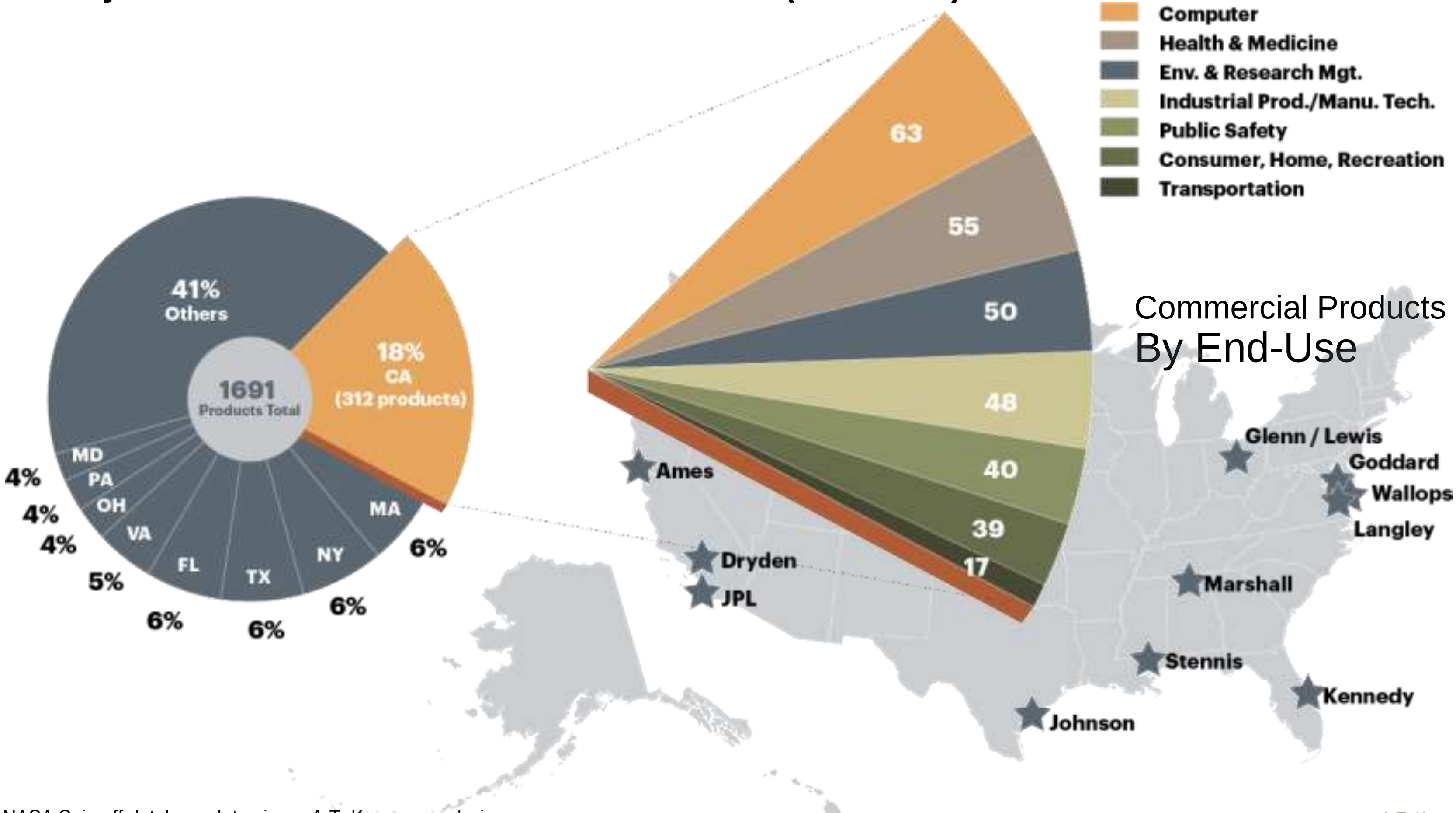
India's GNSS system to be fully operational in 2015

ATKearney

Space industry programs foster small businesses and innovation in various economic sectors in California

NASA Technology Transfer and Small Business Innovation Programs

Products by Location of Commercialization & End Use (1976-2012)



Source: NASA Spin-off database; Interviews; A.T. Kearney analysis

ATKearney

Chapter II - California Aircraft Industry Economic Impact Study

Content

- **Aircraft Industry Overview**
- Economic Impact of Aircraft Industry

ATKearney

Global and U.S. Aircraft Industry Trends

Key Global Trends

Commercial Aircraft

- Emerging economies in Asia and Latin America have and will continue to fuel increases in Commercial Aircraft sales driving geographic expansion on the part of the industry's leading companies

Military Aircraft

- Global Military Aircraft Manufacturing has been growing over the past five years due to increased demand for military aircraft, especially from the North America and Europe regions
- The Military Aircraft industry should still grow moderately due to modest spending in defense budgets occurs across the globe, but particularly in Western and developed nations
- Increasing military aerospace product manufacturing capacity has been established in newly industrialized countries; most growth coming from newly industrialized regions such as the Middle East, India, Africa, and Asia

Aircraft MRO

- Aircraft MRO industry is expected to reverse a declining trend, seeing an increase in demand from domestic and international airlines, larger fleet sizes, and longer average trip lengths

Key U.S. Trends

Commercial Aircraft

- The United States is a major market for aircraft products and components, leading the world in commercial aircraft manufacturing and production
- The commercial aircraft industry faces competition on two levels: internal and external. Internal competition results from competitive factors common to all or most firms within the industry, while external competition represents threats based in other industries, substitute products or from imports.
- Total number of commercial aircraft industry establishments declined in the United States due to the combination of economic factors and transfer of component manufacturing to Japan and China, which forced many businesses to close

Military Aircraft

- US budgeted military spending peaked during the previous five years and is expected to decrease due to a decline in spending

Aircraft MRO

- Declining revenue in the Aircraft MRO industry over the past five years has resulted in greater consolidation among companies, strong competition and a reduced number of industry participants

Source: Global Military Aircraft & Aerospace Manufacturing (IBISWorld Industry Report C2544-GL); Aircraft Maintenance, Repair & Overhaul in the US (IBISWorld Industry Report 48819); Global Commercial Aircraft Manufacturing (IBISWorld Industry Report C2543-GL)

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Aircraft can be defined very broadly; for the purposes of the study, we are focused on five segments and NAICS codes

Aircraft Segmentation and Associated NAICS Codes

Aircraft Manufacturing	• 336411 (Aircraft conversion, manufacturing, overhaul, or rebuild; includes helicopters, blimps, gliders, UAVs, ultra-light and autogiros)
Engine and Parts Manufacturing	• 336412 (Engine and parts manufacturing, overhaul, rebuild, and prototyping)
Other Aircraft Parts and Auxiliary Equipment	• 336413 (Aircraft assemblies, subassemblies, brakes, controls, fuselage, propellers, wheels, airframe, and joints)
Search, Detection, Navigation, Guidance, & Nautical Instruments	• 334511 (Aircraft instrumentation including radar, ATC, navigation, airspeed, etc…)
Aircraft Maintenance, Repair, and Overhaul (MRO)	• 488190 (Aircraft MRO, specialized services for air transportation including maintenance, repair, fueling, inspection, and testing)

Source: NAICS.com

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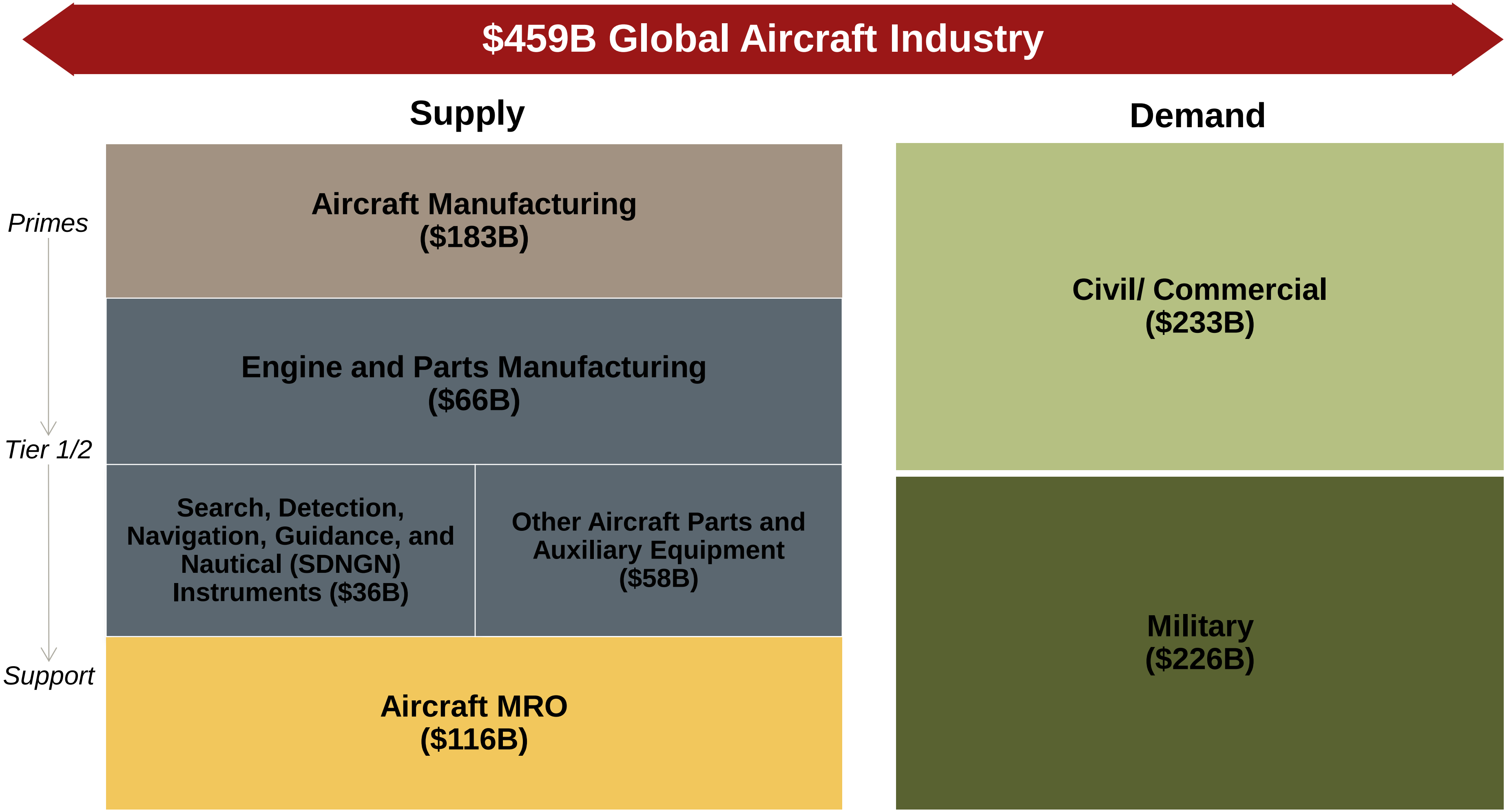
Manned and Unmanned aircraft is an estimated $459B global industry

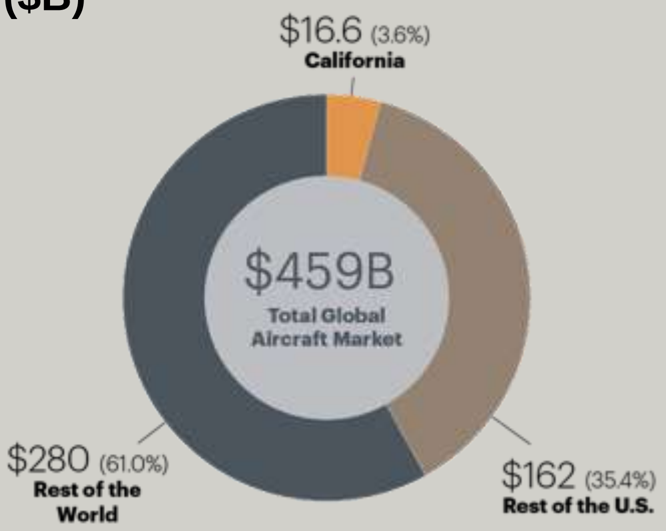


Source: IBIS; AIA Global Aerospace Market Outlook and Forecast; A.T. Kearney Analysis

ATKearney

California has a 3.6% share of the global Aircraft market, generating over $16.6B in direct revenue within the state

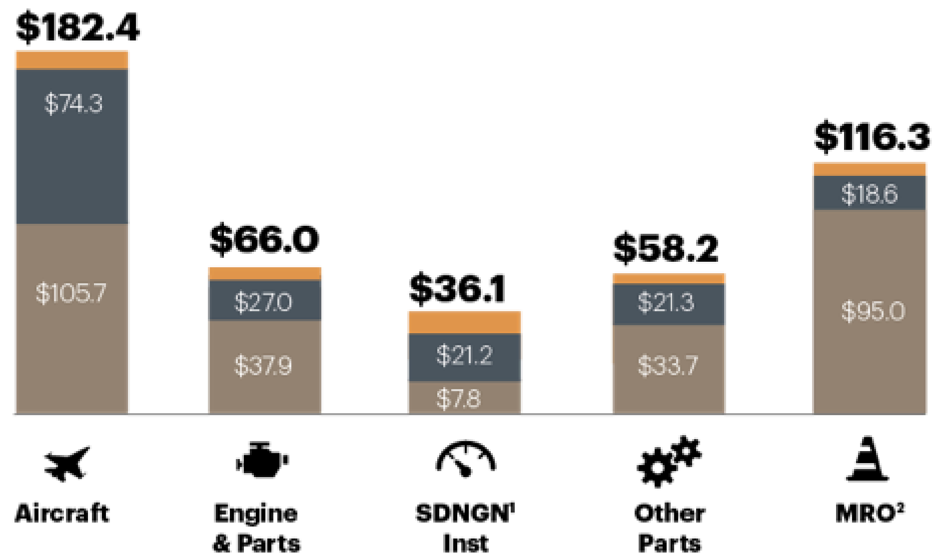
Total Global Aircraft Market ($B)



Key Changes

- Offsetting shifts in the industry are expected to keep CA's Aircraft market share nominal:
  - Tighter government spending
  - Growing commercial sector
  - Expansion of UAV usage

Revenue by Sector ($B)



Recent Changes Impacting Revenue Shares

- Search, Detection, Navigation, Guidance, and Nautical instruments have led the CA Aircraft revenue contribution
- SDNGN is expected to grow as increased sensor usage on aircraft and UAVs continues
- In the near term, increased commercial orders are expected to support CA's Aircraft parts manufacturing sector

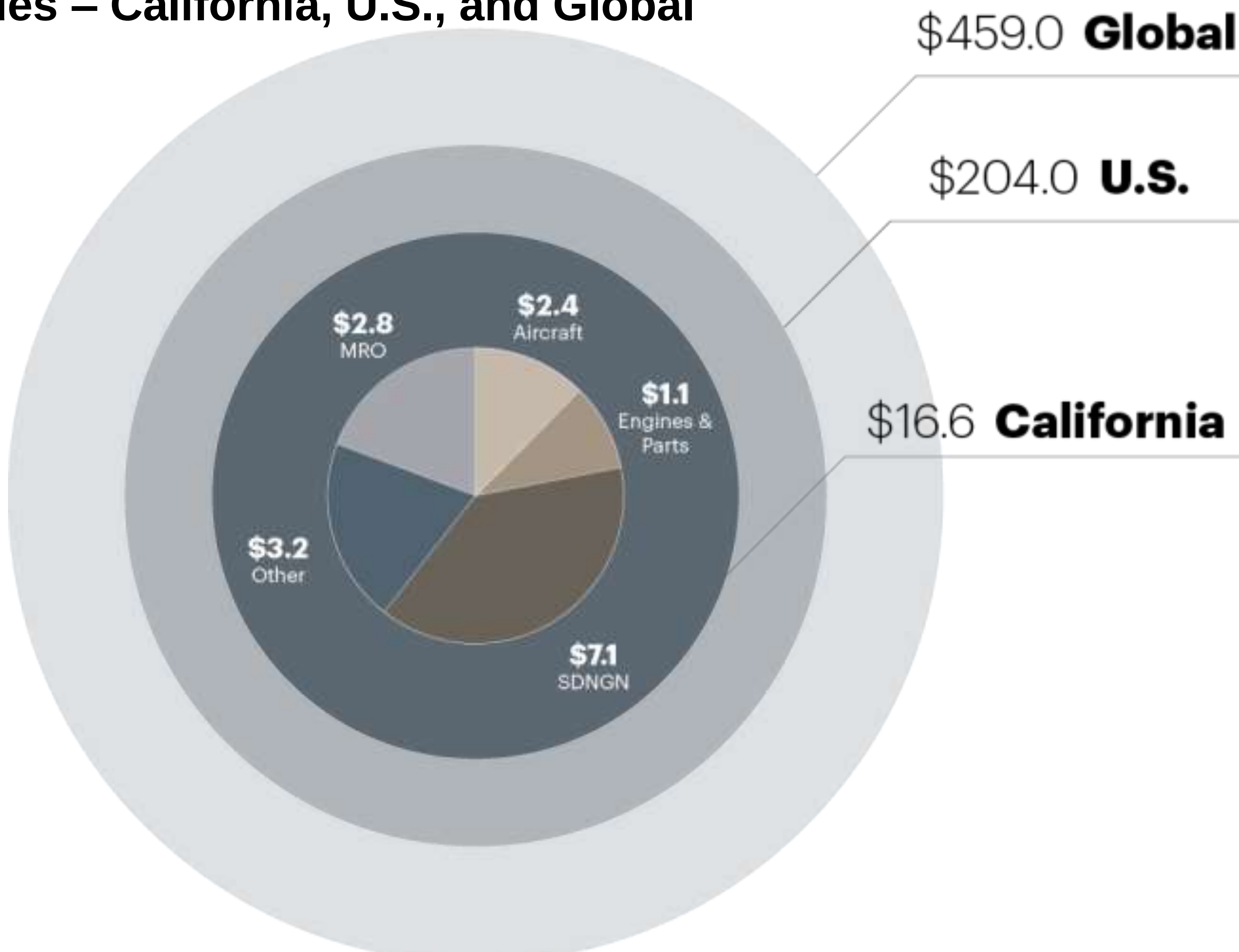
1. Search, Detection, Navigation, Guidance, and Nautical (SDNGN) Instruments
2. Maintenance, Repair, and Overhaul

Source: IBIS ; AIA Global Aerospace Market Outlook and Forecast; A.T. Kearney Analysis

ATKearney

California Aircraft revenues represent 8% ($16.6B) of the U.S. market ($204B) driven by SDNGN[1]

Aircraft Revenues – California, U.S., and Global ($B)



1. Search, Detection, Navigation, Guidance, and Nautical (SDNGN) Instruments
Source: OneSource, IBIS

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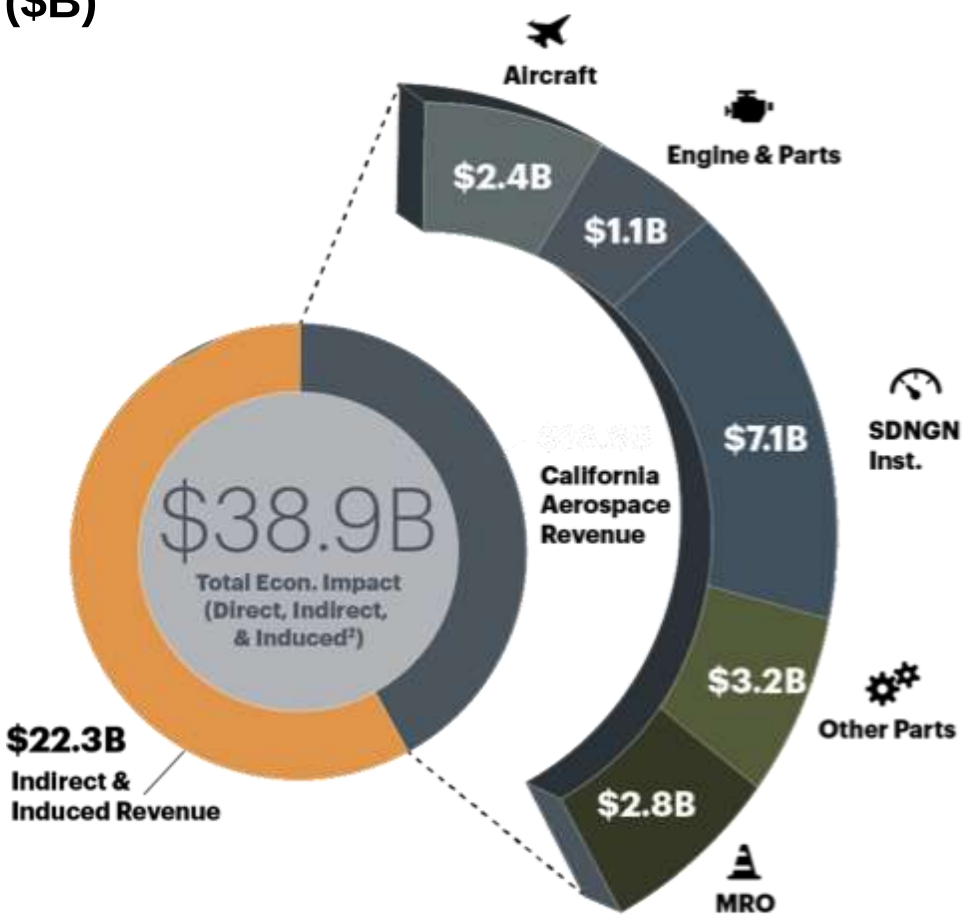
The California Aircraft industry creates $38.9B in total economic impact from a base revenue of $16.6B

Aircraft Industry Economic Impact[1] to California's Economy ($B)



California Revenues of Select Industries[2]
$16.6B Aircraft
$27.0B Arts, Entertainment, and Recreation
$34.8B Agriculture
$69.2B Bioscience

1. Direct, Indirect, and Induced based on the BEA's sector output multipliers
2. CA Gov. Office; Biotech Industry Organization: Bioscience Economic Development

Source: IBIS; BEA; A.T. Kearney analysis

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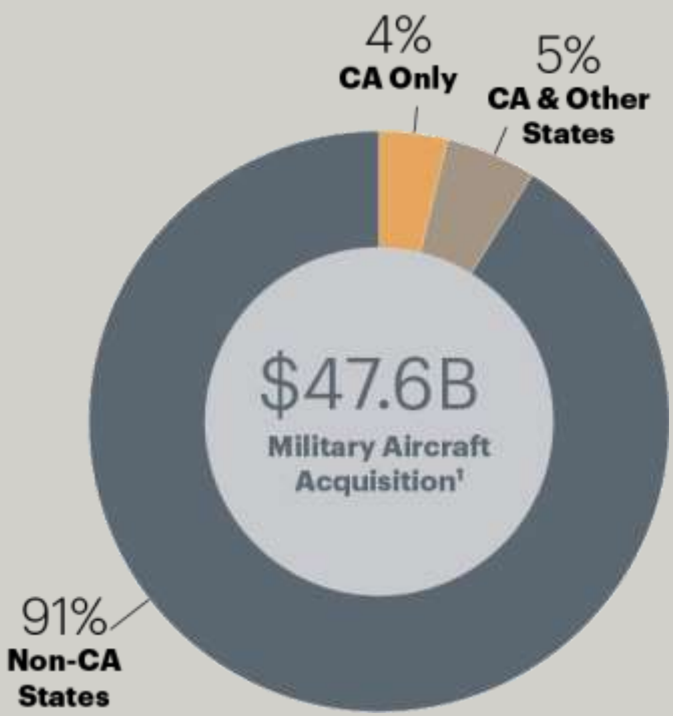
In 2013, Aerospace firms located in CA supplied 4-9% of the U.S. military aircraft

Military Aircraft Spend by Prime Contractor Location ($B)



Non-exhaustive[2]

Program	Spend	Prime Contractors	Locations
F-35	$9.17B	Lockheed, Pratt & Whitney	TX, CT
P-8A Poseidon	$3.26B	Boeing, CFM International	WA, OH
F-18	$2.18B	Boeing, GE	MO, MA, CA
V-22 Osprey	$1.94B	Bell, Boeing	TX, PA
Predator / Reaper	$1.91B	General Atomics	CA
KC-46A	$1.82B	Boeing	WA
Chinook	$1.46B	Boeing	PA
Black Hawk	$1.31B	Sikorsky	CT
C-5 Galaxy	$1.28B	Lockheed	GA
Global Hawk	$1.25B	Northrop	CA, NY
Apache	$1.18B	Northrop, Lockheed	MD, NY
E-2D Adv. Hawkeye	$1.16B	Northrop, Rolls Royce	NY, FL, IN
EA-18 Growler	$1.07B	Boeing, GE	MO, MA
C-130J Hercules	$0.84B	Lockheed	GA
F-22	$0.80B	Lockheed, Boeing	GA, CA, WA
Shadow / Raven	$0.23B	AAI Corp, AeroVironment	MD, CA

- Major programs located in CA based on prime contractor location

1. Military acquisition spend includes Procurement and Research, Development, Test & Evaluation (RDT&E)
2. List of programs are not exhaustive

Source: Program Acquisition Cost by Weapon System

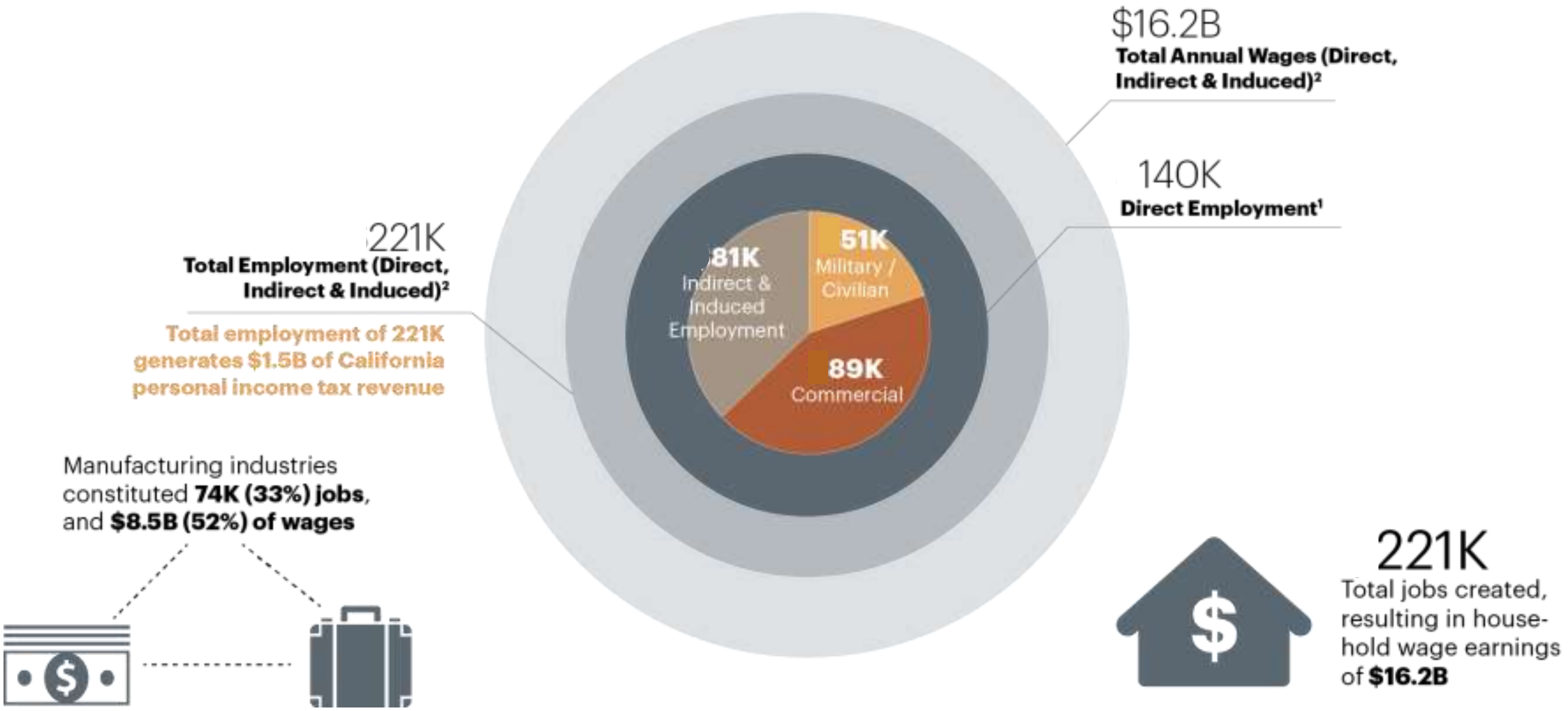
Content

- Aircraft Industry Overview
- **Economic Impact of Aircraft Industry**

ATKearney

The California Aircraft industry has 140,000 direct employees and creates a total of 221,000 jobs across all industries

2012 Aircraft Industry Employment and Wage Contribution to California Economy



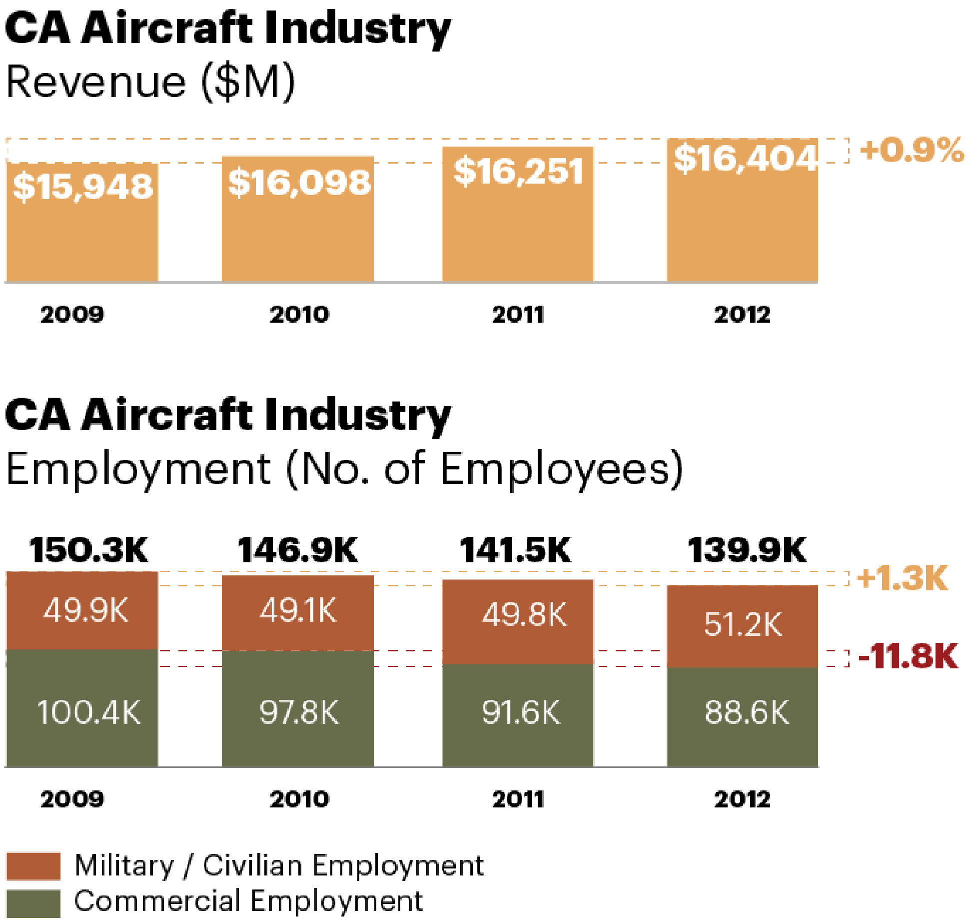
1. Total jobs and wages based on RIMS II multipliers from U.S. Bureau of Economic Analysis
2. Induced and indirect wages and employment derived by using RIM II multipliers

Source: Bureau of Labor Statistics; navair.mil; uscg.mil; af.mil

ATKearney

Despite modest revenue growth, the California Commercial Aircraft industry has lost nearly 12K jobs

Aircraft Industry Trends in California



Factors Influencing Employment

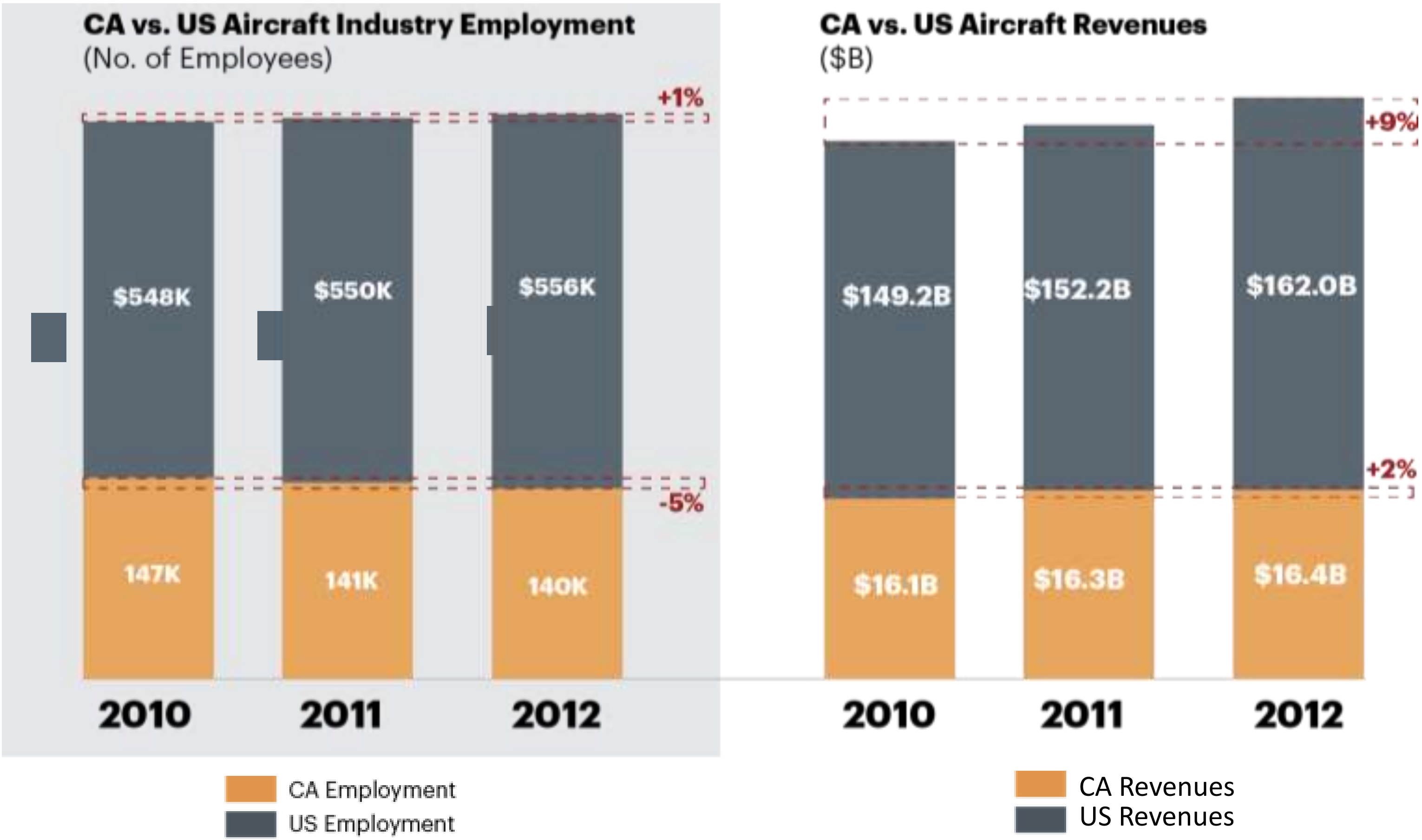
- Upward trends of ~1% in revenues over the past 4 years is due to increases in commercial aircraft orders
- Reductions in DOD spending across aircraft programs are impacting private sector employment; this is compounded by competition from companies abroad

Source: AIA; IBIS; Reuters; A.T. Kearney analysis

ATKearney

CA aircraft industry employment and revenues lag the growth seen in the broader US economy by 6% and 7%, respectively

Aircraft Industry Trends in California



Source: AIA; IBIS; Reuters; A.T. Kearney analysis

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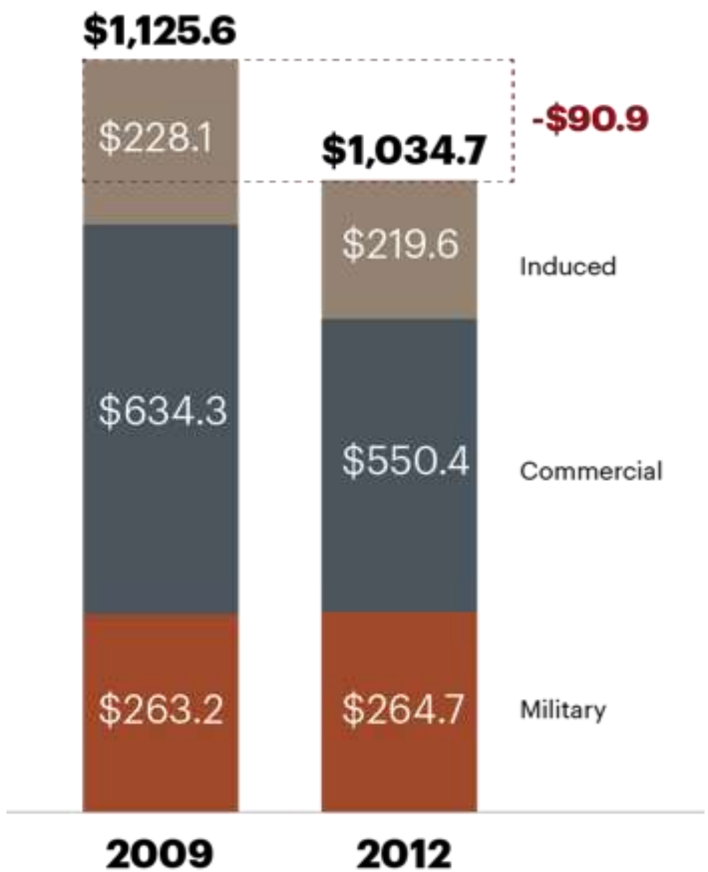
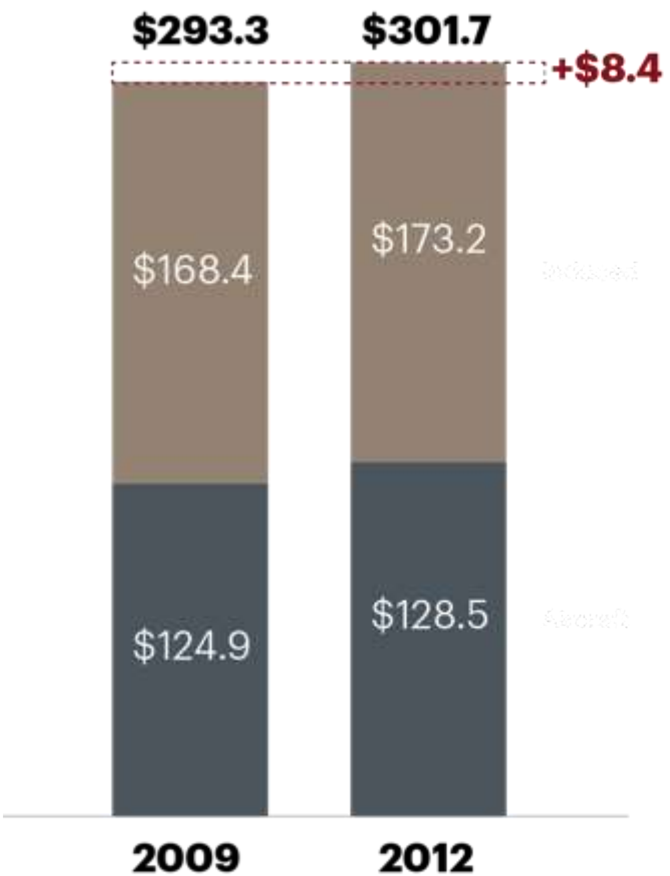
In California, job loss has driven a net reduction in annual tax revenues of $82.5M, reaffirming a worrisome trend

California Income Taxes[1] ($M)



California Corporate Taxes[2] ($M)



1. CA income tax rate schedules for personnel are assumed as “Single or married/RDP filing separately”
2. CA corporate tax rate for aerospace companies is assumed to be 8.84%

Source: IBIS; Sate of California Franchise Tax Board; A.T. Kearney analysis

ATKearney

Transformational dynamics are contributing to structural changes in the California Aircraft industry

Aerospace Industry Trends in California

Fragmented Industry Structure

- The landscape in California is dominated by a handful of large firms and sizable fragmentation in the sub-tier supply base
- Consolidating pressures could lead to the exit of weaker players and acquisition of smaller firms

Shift in Labor Force

- Shutdown or pending shutdown of large programs such as the C-17 is leading to a decline in manufacturing jobs
- Growth in commercial aircraft and government funded research creates opportunities for innovation and diversification from traditional methods

Globalization of Supply

- California is a breeding ground for aerospace companies with a local specialized supply base and the availability of a skilled capable workforce
- Globalization of supply has expanded the manufacturing base and introduced low cost players, which is impacting the competitive landscape

Source: "New Face of the A&D Industry: Victors, Victims, and Survivors" A.T. Kearney; "Aerospace in Southern California Still Strong Despite C-17 and Other Losses" from Daily Breeze; **COECCC; LAEDC;**

ATKearney

Deal volume is up 16%; in California, these deals are indicative of the structural changes and consolidation in the industry

Key California Aerospace Deals (March 2012 – March 2013)

Examples,
Non-exhaustive

Aircraft, structures, and support

Date	Target	Acquirer	Value ($M)
Jan-13	Astro Spar, Inc	PRV Aerospace, LLC	Not Disclosed
Jan-13	Embee, Inc.	Triumph Group, Inc	$0.14

Mechanical, propulsion, and landing

Date	Target	Acquirer	Value ($M)
Mar-13	Western Precision Aero LLC	RBC Bearings Inc	$2.6
Jan-13	Martinic Engineering, Inc.	Monogram Aerospace Fasteners	$19
Dec-12	Churchill Aerospace, LLC	Corridor Capital, LLC	$50
Nov-12	Synchronous Aerospace Group	Precision Castparts Corp	Not Disclosed
Sep-12	RSA Engineered Products	Cornerstone Capital Holdings	Not Disclosed
May-12	Sky Manufacturing	MacLean-Fogg Component Solutions	Not Disclosed

Electronics, avionics, and interior

Date	Target	Acquirer	Value ($M)
--	--	--	

Military and defense

Date	Target	Acquirer	Value ($M)
Nov-12	Chandler/May, Inc. (Arlington Capital)	Lockheed Martin Corporation	Not Disclosed
Oct-12	The Spaceship Company (Scaled Composites)	Virgin Galactic (Virgin Group Ltd.)	Not Disclosed
Jul-12	Pratt & Whitney Rocketdyne, Inc.	GenCorp Inc.	$411
Jun-12	Space Systems/Loral, LLC	Macdonald Dettwiler & Associates Ltd.	$1,069
May-12	Composite Engineering, Inc.	Kratos Defense & Security Solutions, Inc.	$155

Growth in commercial engine and airframe applications creates opportunities while shrinking defense spending creates a need to secure supply

Source: “Aerospace and Defense Industry Snapshot” SRR

Chapter III - Competitiveness of California in Aerospace Industry

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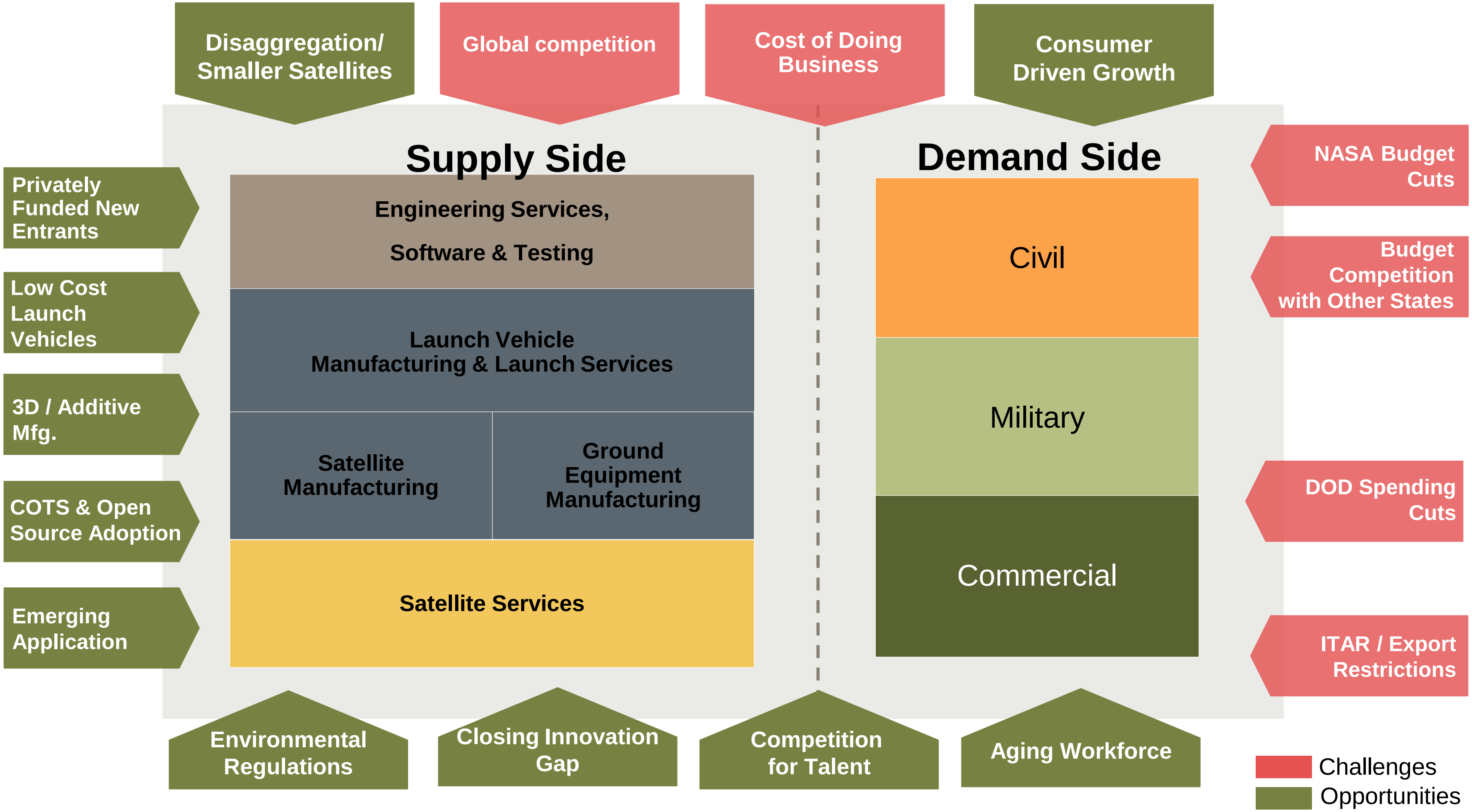
Content

- **Competitiveness of California in Aerospace Industry**
- Conclusions and Recommendations

ATKearney

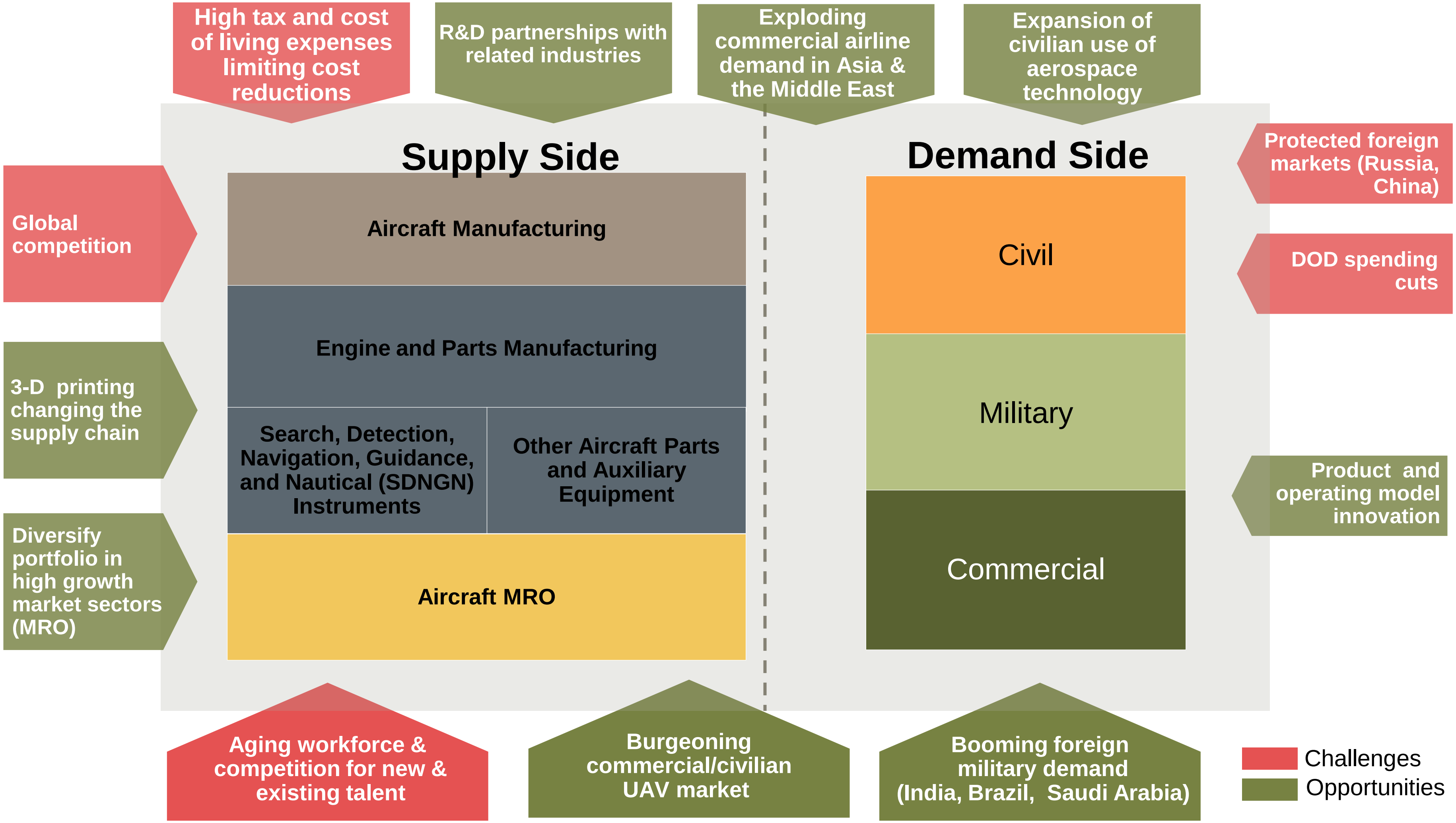
California's Space industry faces new opportunities and challenges, some global and some unique to the state



Source: A.T. Kearney analysis

ATKearney

California Aircraft industry faces several challenges; the state should leverage new industry opportunities



Source: A.T. Kearney analysis

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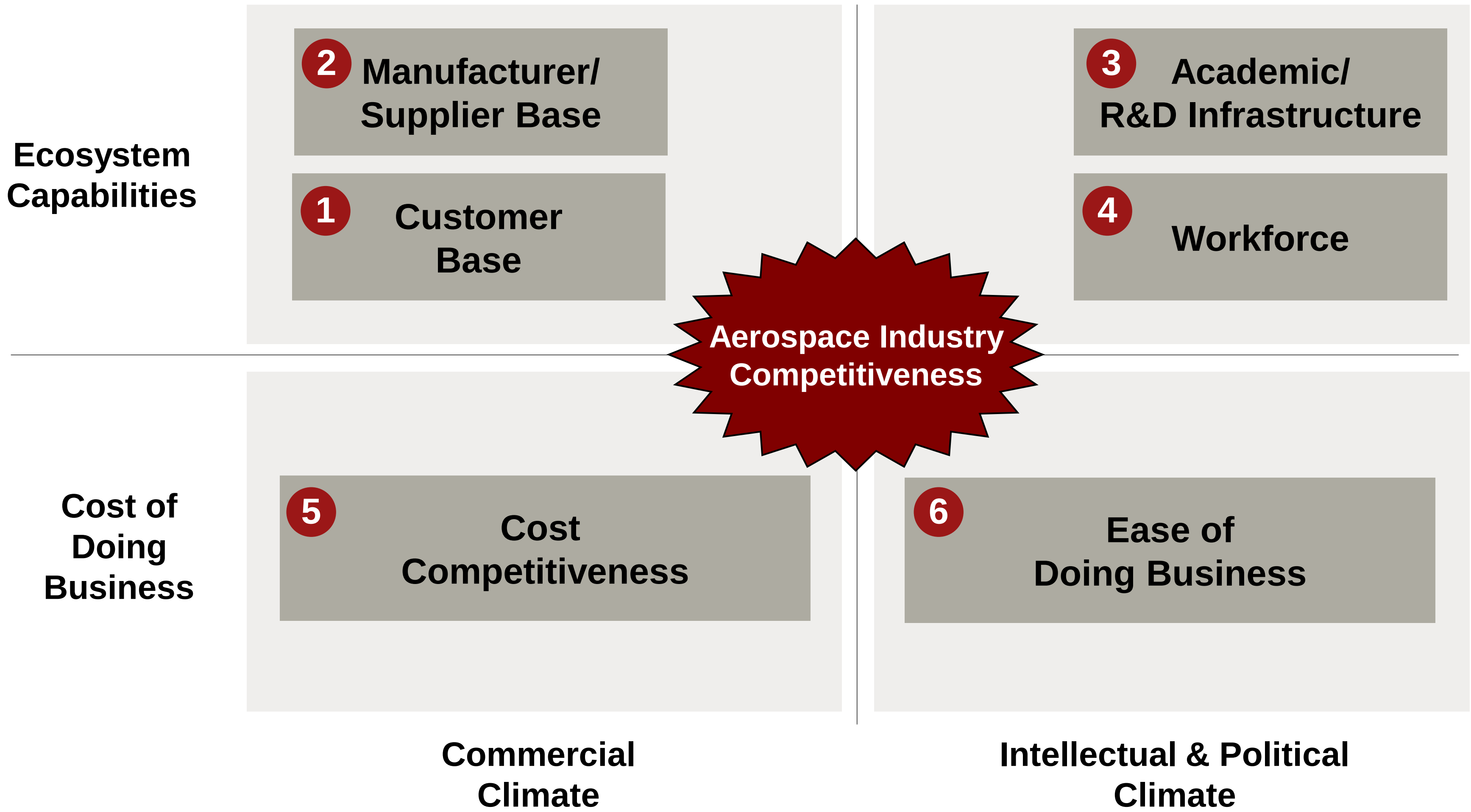
The competitiveness of the overall Aerospace industry in California can be assessed along six attributes

Industry Competitiveness Framework



Source: A.T. Kearney analysis

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The strong government customer base, including the “crown jewel”, SMC, is pivotal for the California Aerospace industry

Major Government and Civil Space Industry Customers

Army Space and Missile Defense Command
Location: Peterson AFB, CO

Air Force Space Command
Location: Peterson AFB, CO

Air Force Research Laboratory (AFRL)
Location: Wright-Patterson AFB, OH

Glenn
Location: Cleveland, OH
Expertise: Power Systems

Ames
Location: Near Sunnyvale, CA
Expertise: Aeronautics & Small Spacecraft

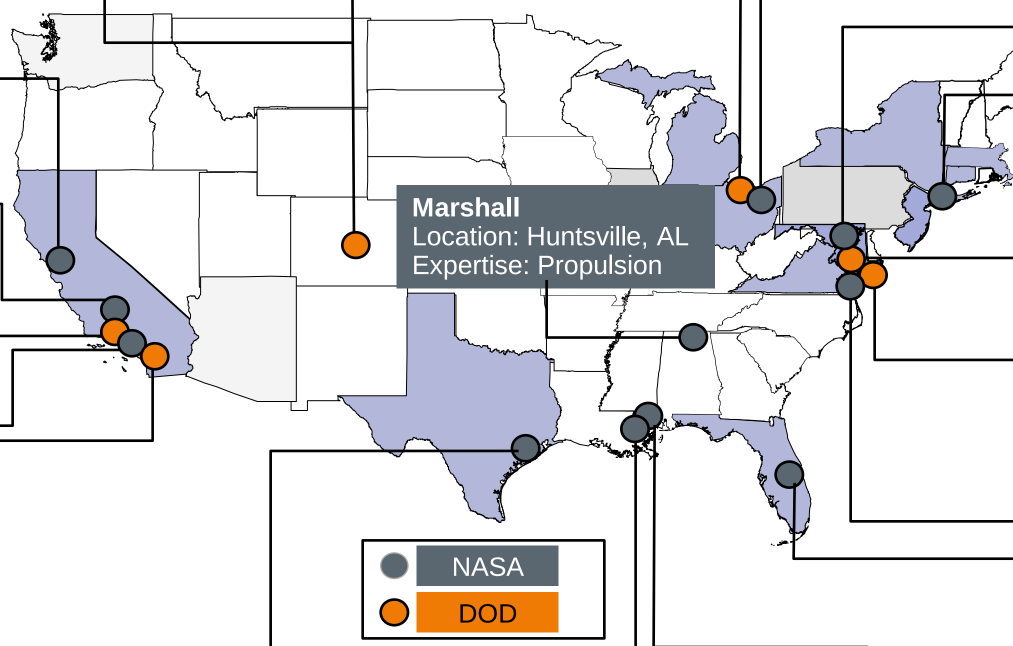
Dryden
Location: Near Mojave, CA
Expertise: Airplanes & Human Spaceflight

Space and Missile Systems Center (SMC)
Location: Los Angeles AFB

JPL
Location: Pasadena, CA
Expertise: Aeronautics & Small Spacecraft

Space & Naval Warfare Systems Command
Location: San Diego, CA

Marshall
Location: Huntsville, AL
Expertise: Propulsion



Goddard
Location: NY & MD
Expertise: Earth & Planetary Science

Naval Research Laboratory (NRL)
Location: Wash DC

Nat’l Reconnaissance Office
Location: Chantilly, VA

Langley
Location: Hampton, VA
Expertise: Aeronautics

Kennedy
Location: Central FL
Expertise: Launch

Johnson
Location: Houston, TX
Expertise: Human Spaceflight

Marshall / Michoud
Location: New Orleans, LA
Expertise: Assembly

Stennis
Location: Gulf Port, MS
Expertise: Propulsion

1. Note: A&D concentration (in terms of the number of companies) is higher for shaded states

ATKearney

The Space & Missile Systems Center at Los Angeles AFB fosters a dynamic ecosystem of prime contractors and top-tier suppliers

Overview of El Segundo, CA & Hawthorne, CA

Legend: Government | Prime Contractor | Other Supplier / Company

ATKearney

California companies span across the Space industry and lead important segments such as Satellite Manufacturing

Partial List

Segment	Sub-segment	California		U.S.	Rest of the World
Launch		▪ SpaceX ▪ Boeing Launch Services	◕	▪ United Launch Alliance ▪ Orbital	▪ Arianespace ▪ Khrunichev ▪ Yuzhnoye ▪ TsSKB-Progress ▪ CNSA (China)
Satellite Mfg.	Primes & Payload	▪ Lockheed Martin (Sunnyvale) ▪ Boeing ▪ Northrop Grumman ▪ SS / Loral ▪ SAIC	●	▪ Lockheed Martin (Denver) ▪ Orbital ▪ General Dynamics ▪ Ball	▪ EADS Astrium ▪ Thales Alenia Space ▪ Mitsubishi ▪ MacDonald, Dettwiler ▪ OHB Technology
	Propulsion	▪ Aerojet Rocketdyne	◕	▪ ATK	▪ Safran (Snecma)
	Tier 2 / 3	▪ L-3	○	▪ Honeywell ▪ United Technologies ▪ ITT ▪ Moog	▪ Com Dev ▪ Thales Alenia ▪ Tesat ▪ FinMeccanica
Ground Equipment		▪ ViaSat ▪ Trimble ▪ Magellan ▪ Mio	◐	▪ Garmin ▪ HughesNet ▪ Sirius XM	▪ Various Chinese / Taiwanese suppliers
Engineering Services		▪ The Aerospace Corp ▪ Raytheon ▪ Jacobs Technology ▪ SAIC	●	▪ United Space Alliance ▪ ATK ▪ CSC	
Satellite Services	Direct-to-Home (DTH)	▪ DirecTV	●	▪ Dish / EchoStar	▪ British Sky Broadcasting ▪ Other regional / local DTH
	Digital Audio / Radio (DARS)		○	▪ Sirius XM	
	Fixed Sat. Services (FSS)	▪ ViaSat	◐	▪ Intelsat / PanAmSat ▪ Loral Skynet /Telesat	▪ SES / New Skies ▪ Eutelsat ▪ JSAT ▪ Shin Satellite ▪ Space Comm Corp
	Mobile Sat. Services (MSS)		○	▪ MSV ▪ Iridium ▪ ICO ▪ Terrestar ▪ Orbcomm ▪ Globalstar	▪ Inmarsat ▪ Asia Cellualr ▪ Thuraya
	Remote Sensing	▪ Skybox Imaging ▪ Planet Labs	◐	▪ DigitalGlobe / GeoEye	▪ RapidEye ▪ Spot Image

California Supplier Base Position: ● Strong players / leadership in sector ◐ Some supplier base in sector ○ Weak position in sector

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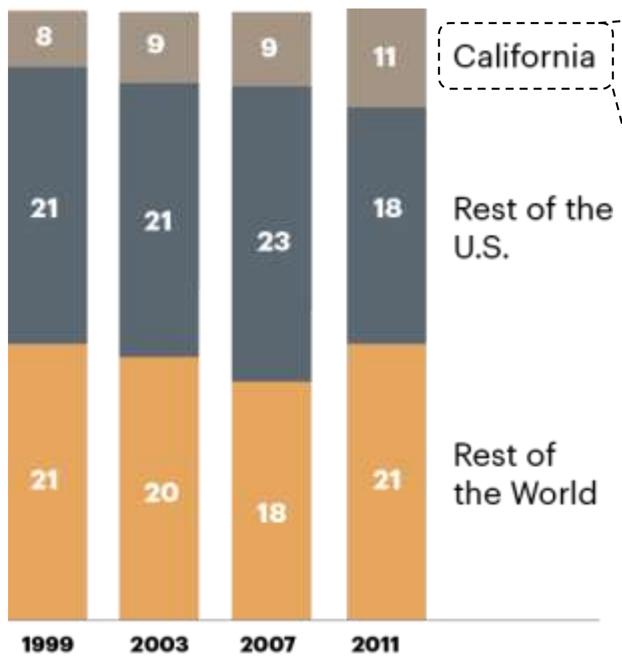
Leading California space companies maintain a strong global position, with strong growth since 2007 in Eng. & Services

Top 50 Space Companies (Number)



California Companies on the List

Name	1999 Rank	2003 Rank	2007 Rank	2011 Rank
Boeing	1	1	2	2
Northrop Grumman	25	5	3	4
Raytheon	5	4	5	5
Trimble Navigation	n/a	17	14	10
SS / Loral	7	20	21	16
ViaSat	n/a	28	36	22
Jacobs Engineering	n/a	38	30	23
SAIC	n/a	6	13	28
Aerojet	26	30	25	34
Wyle	n/a	n/a	n/a	37
Kratos Defense	n/a	n/a	n/a	42

- A notable omission from the SpaceNews Top 50 survey is SpaceX of Hawthorne, CA
- Since 2007, there has been a growth in the scale of space engineering and service providers as companies take advantage of the talented space workforce in California
- Incumbent large space companies have diversified new investments outside of California

Source: SpaceNews; A.T. Kearney analysis

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Two case studies show how California companies have unique advantages when competing in the Global Space industry

Case Study: Neighbors as Partners

Boeing Commercial Satellites & Space Exploration Technologies

- The all-electric propulsion on Boeing's new 702SP ("Small Platform") satellite greatly reduces satellite weight at launch through lower fuel loading, but retains the payload capabilities of a larger satellite
- El Segundo-based Boeing Commercial Satellites has partnered with Hawthorne, CA's SpaceX to sell the 702SP along with a tandem launch using the Falcon 9 launch vehicle for a single low-cost price
- At least two international 702SP buyers will cut their launch costs in half through a shared Falcon 9 launch by this Boeing-SpaceX partnership

Case Study: Innovation in Silicon Valley

Skybox Imaging & Planet Labs

- Two venture capital-backed California startups are using low-cost, but cutting-edge microsats and minisats to gain a competitive advantage in the earth imaging industry
- Skybox Imaging (Mountain View, CA), started by four Stanford University graduate students in Aerospace Engineering, combines Big Data analytics to provide near real-time space imagery to commercial customers
- The founders of Planet Labs (San Francisco, CA) come from NASA's Ames Research Center and are using a "flock" of 28 microsats to provide high frequency, full-earth coverage

Source: Space Exploration Technologies; Boeing Corp.; Skybox Imaging Inc.; Planet Labs Inc.

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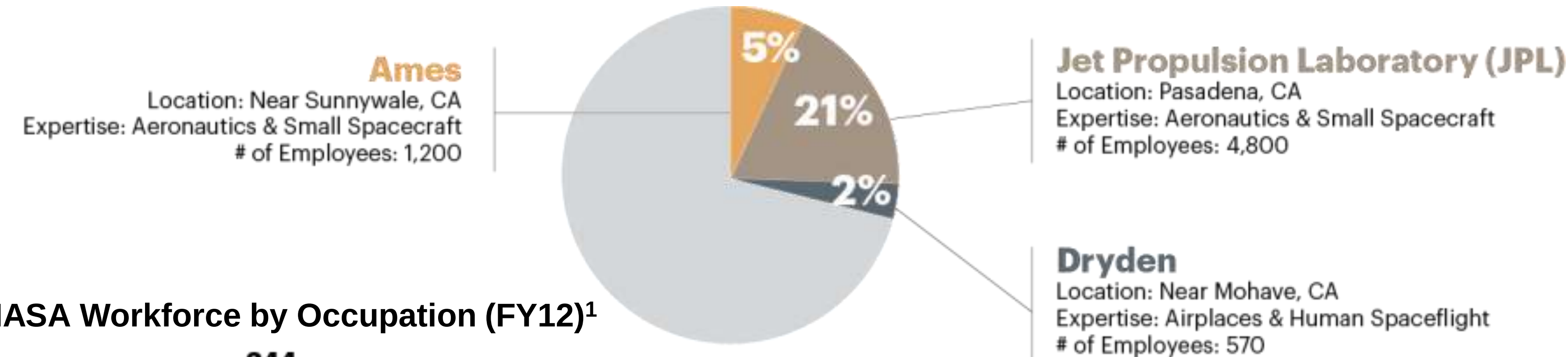
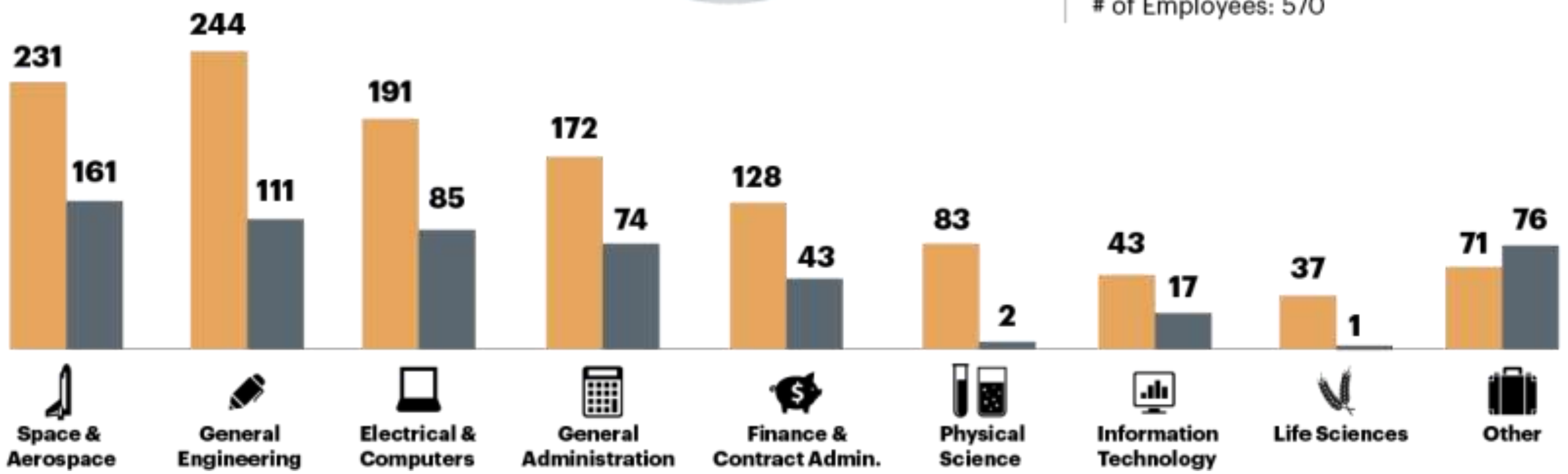
California benefits from a trio of NASA research centers that employ 30% of the NASA workforce…

Workforce at NASA Centers in California as a percentage of Total NASA Workforce



NASA Workforce by Occupation (FY12)[1]



1. Workforce breakdown for JPL not publicly available

Source: NASA/JPL; NASA Workforce Information Cubes; A.T. Kearney analysis

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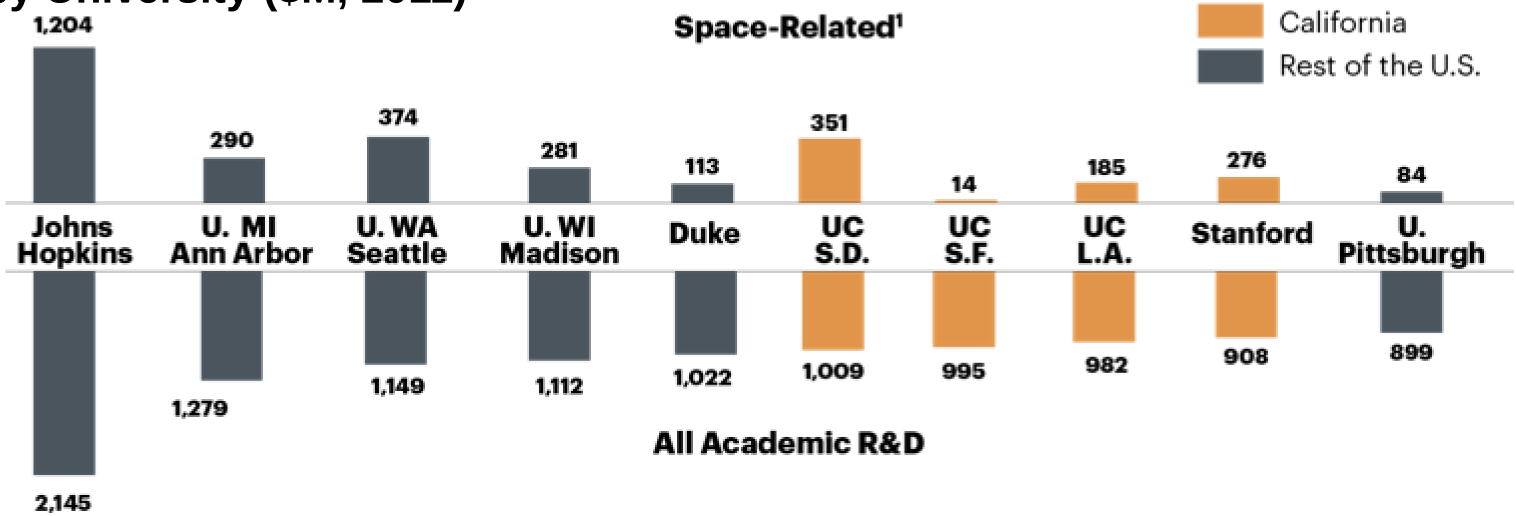
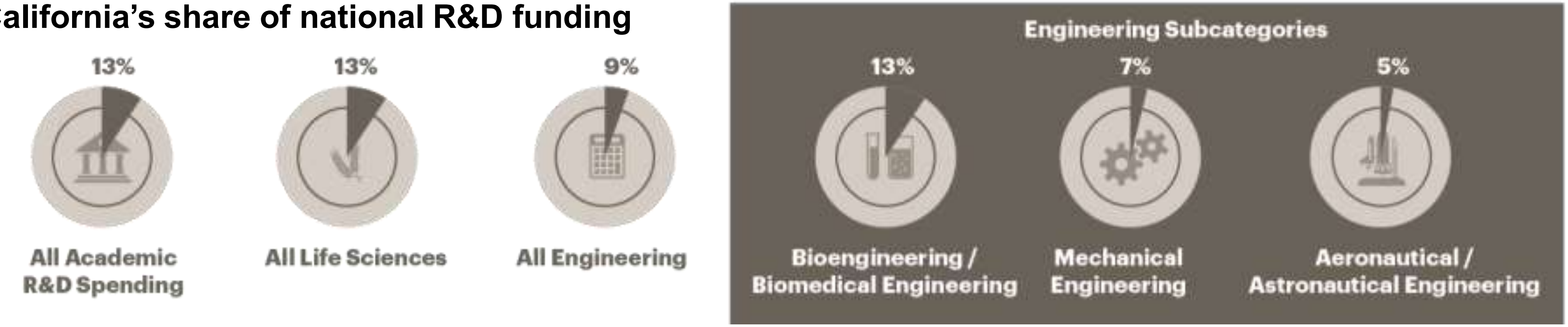
…but much of the Academic research funding to California goes to categories outside of Space-related fields

Total R&D Spend vs. Space-Specific R&D Spend by University ($M, 2011)



California's share of national R&D funding



1. Space-Related R&D Categories include Engineering, Physical Sciences, Math & Computer Sciences, and Environmental Sciences
Source: National Science Foundation; A.T. Kearney analysis

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Closer cooperation with Silicon Valley can further unlock unmatched R&D synergies

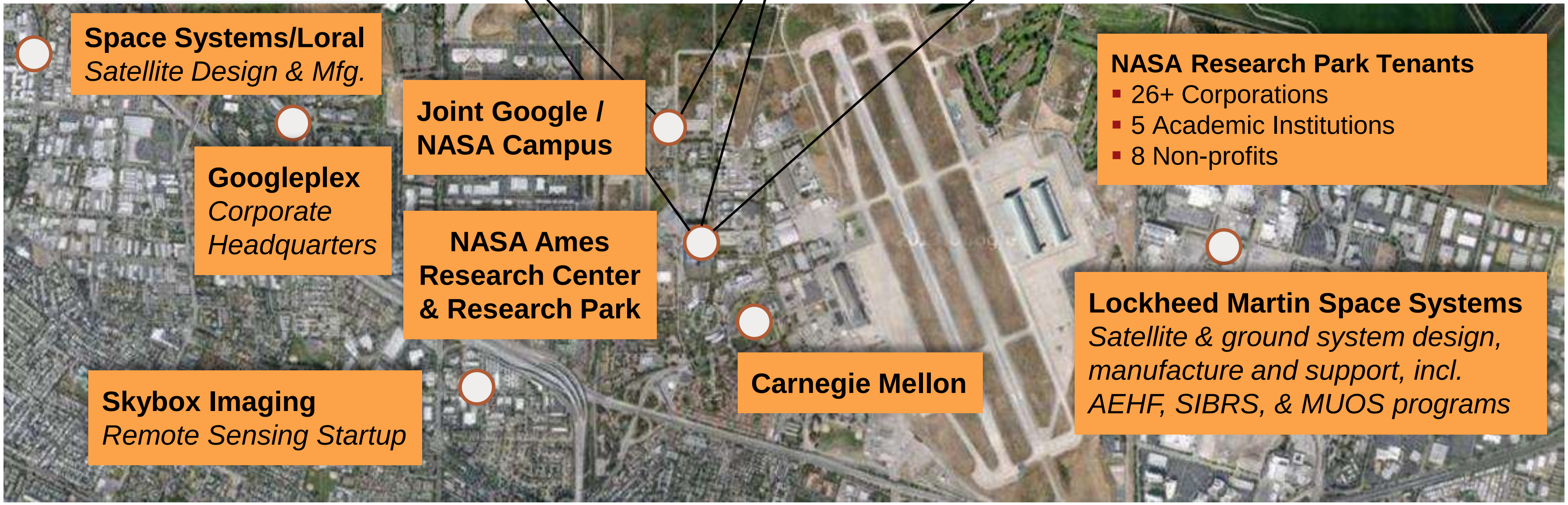
Selected NASA-Ames Partnerships

Going Green: Google's Earth Engine database combines satellite imagery from NASA's Landsat 7 satellite with programming and parallel computing to provide researchers everywhere a detailed and local look at global deforestation between 2000-2012

Quantum Computing: In 2013, Google, Ames Research Center, and the Universities Space Research Association partnered to pursue advanced research in quantum computing with an end-goal of greatly improving artificial intelligence

Incubating Space Technologies: Startup **Made In Space** at the Ames Research Center has developed and tested the first zero-gravity 3-D printer in partnership with NASA, to send to the International Space Station in the second half of 2014

Satellite Map of Area Around Ames Research Center

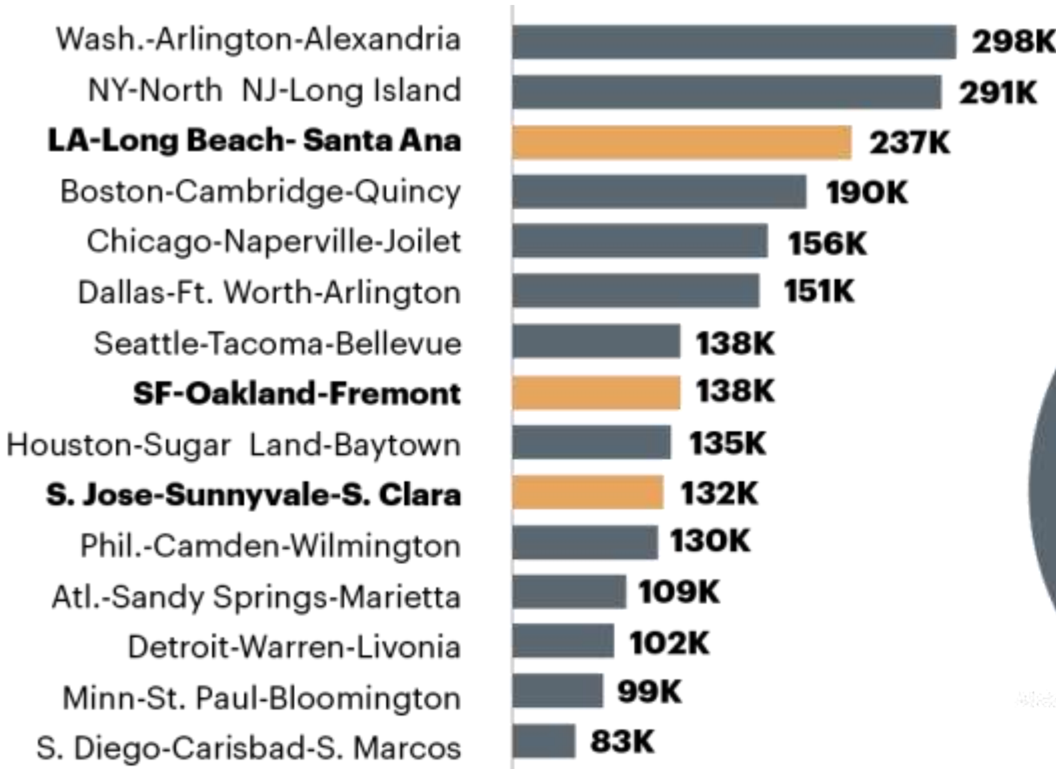


Source: Google; NASA Ames Research Center; Made in Space; A.T. Kearney analysis

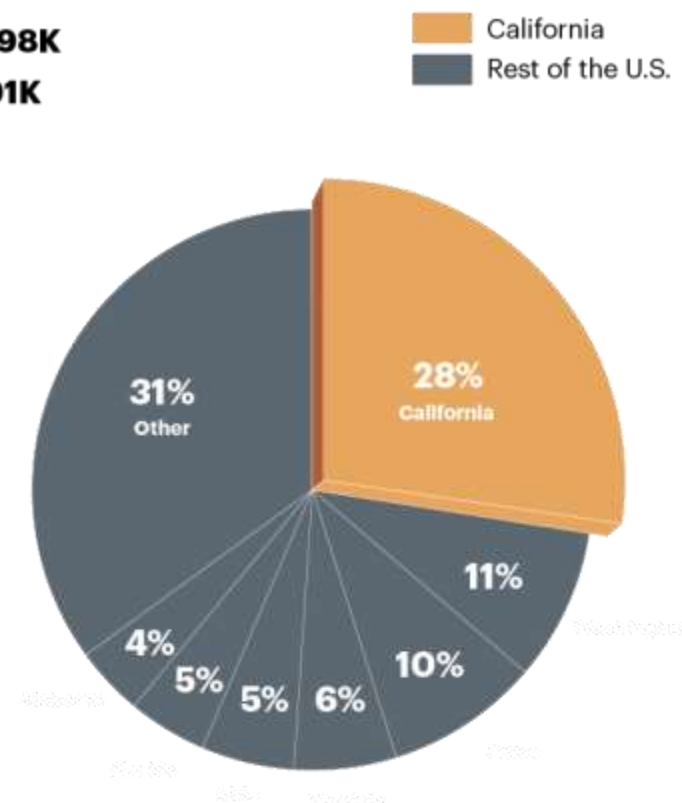
A.T. Kearney

California's workforce continues to attract and anchor Aerospace companies to California

Largest Metropolitan Areas by Number of Science & Engineering Jobs (2010)



Aerospace Engineer Jobs by State (% of Total)



Source: NSF; Department of Labor; A.T. Kearney analysis

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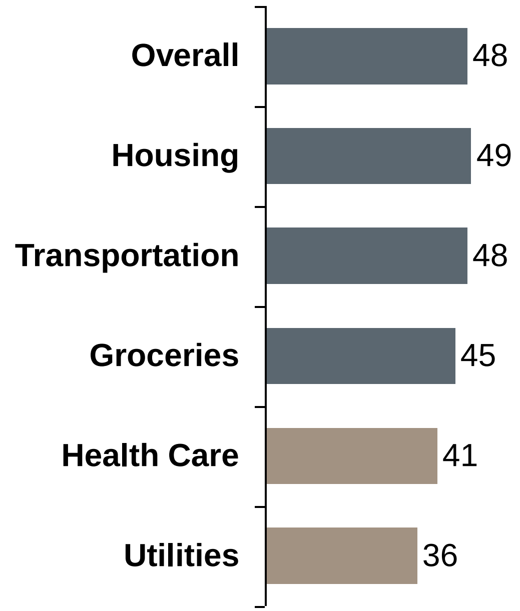
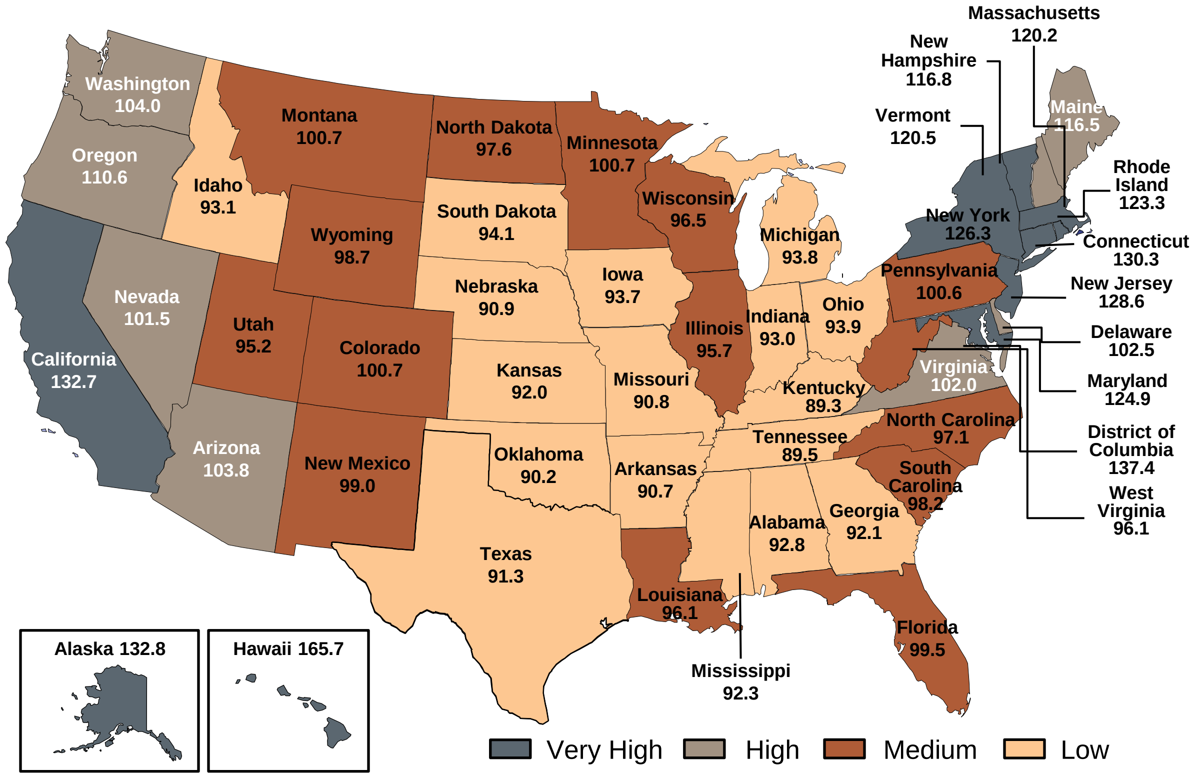
However, relatively high cost of living adversely impacts California's ability to attract and retain talent

California Ranking in Major Cost of Living Components



Cost of Living Index 2010



Quotes from Interviews

"…High cost of living adds to costs of doing business in California"

"…Cost of living, particularly housing, is a major reason for talent attrition in the government space sector"

"…It is tougher to attract mid-career talent out of state because of cost of living"

Source: C2ER (2010 U.S. Census); Interviews; A.T. Kearney analysis

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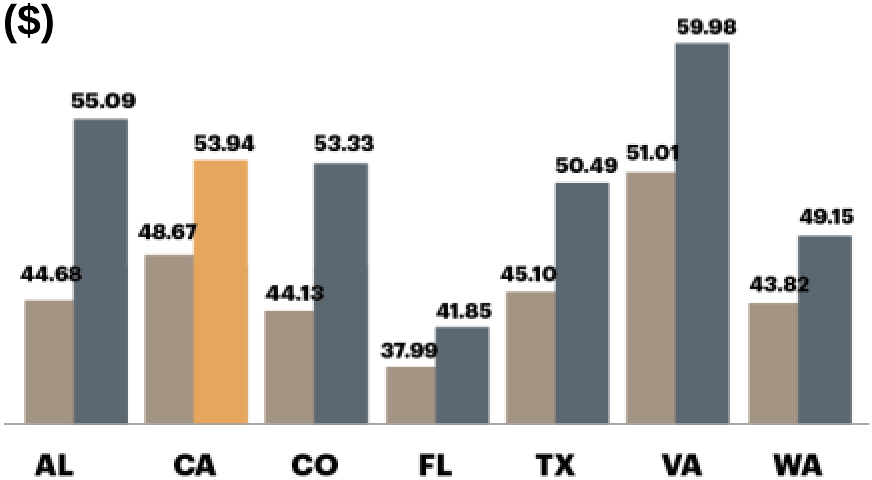
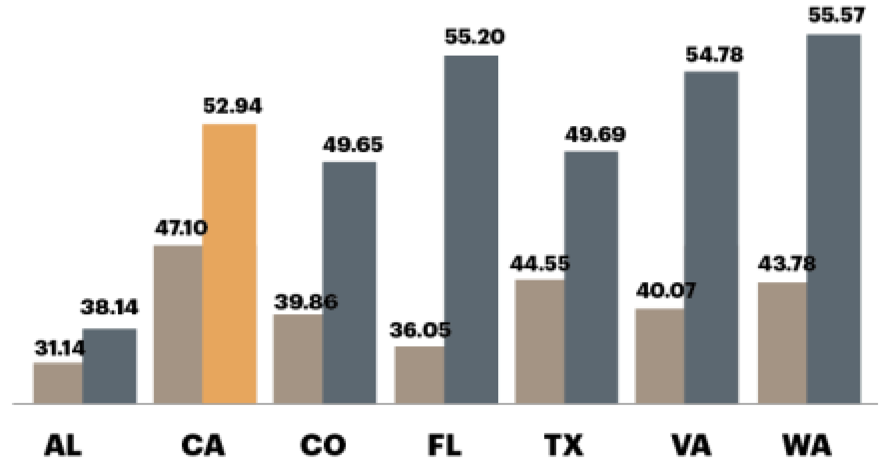
The wage gap between California and other states has narrowed in recent years as demand has risen in competing states

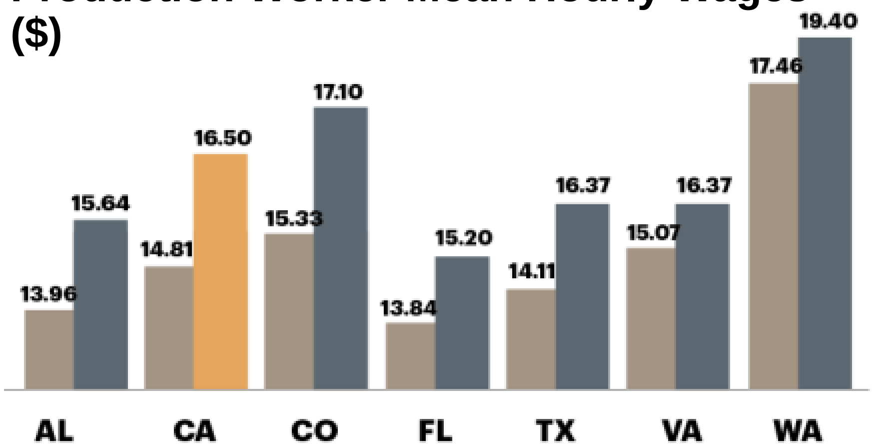
Aerospace Engineer Mean Hourly Wages ($)



Sales Engineer Mean Hourly Wages ($)



Production Worker Mean Hourly Wages ($)



Source: Department of Labor; Bureau of Labor Statistics; A.T. Kearney analysis

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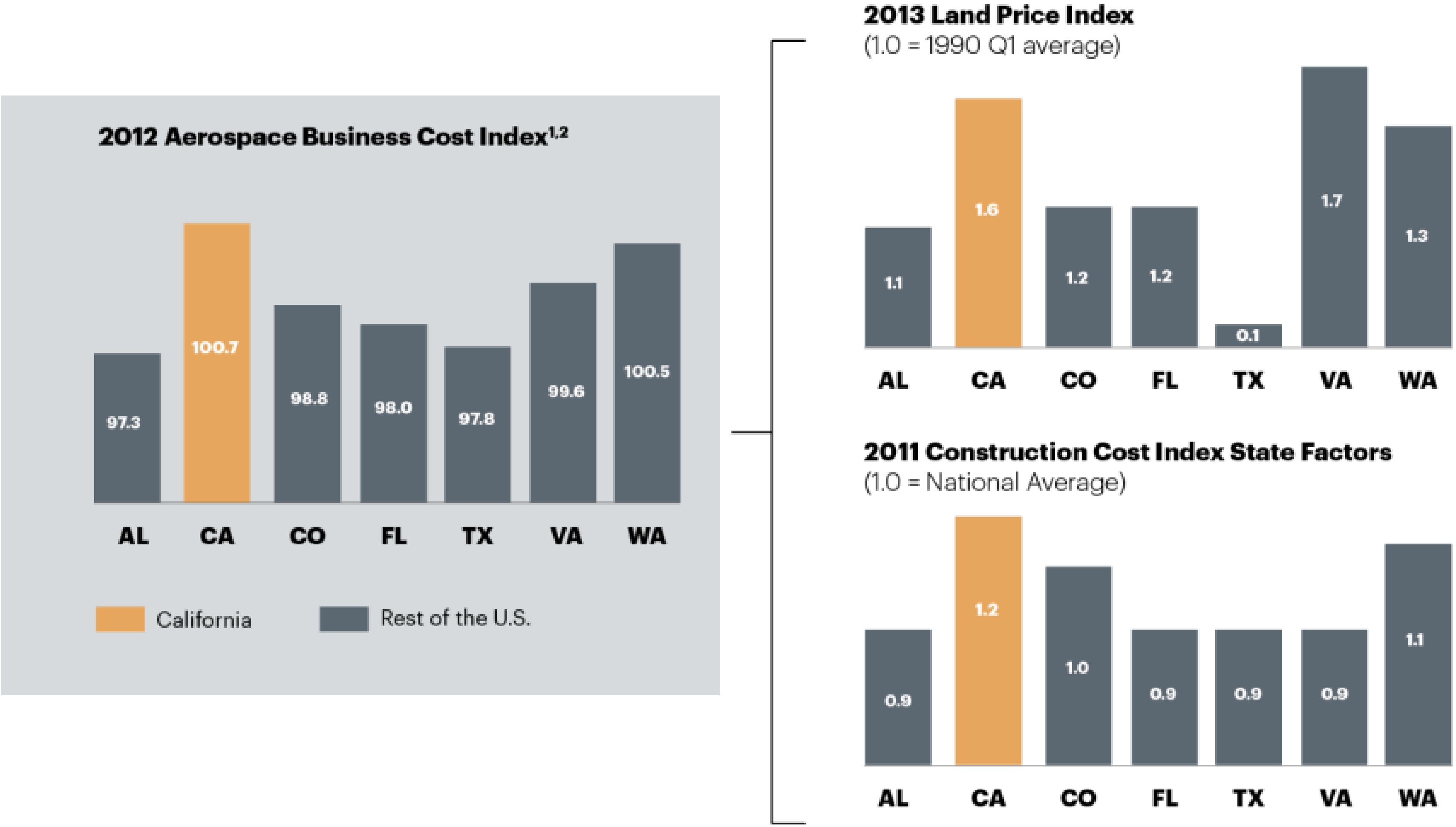
California's competitive disadvantage in real estate and construction costs is a barrier for attracting new investment



1. Averages for city & counties with major space industry customer or supplier base
2. Business Cost Index includes: labor costs, facility costs, transportation costs, utility costs, taxes, and population trends and education levels

Source: KPMG; Lincoln Institute of Land Policy; U.S. Army Corps of Engineers CWCCIS; A.T. Kearney analysis

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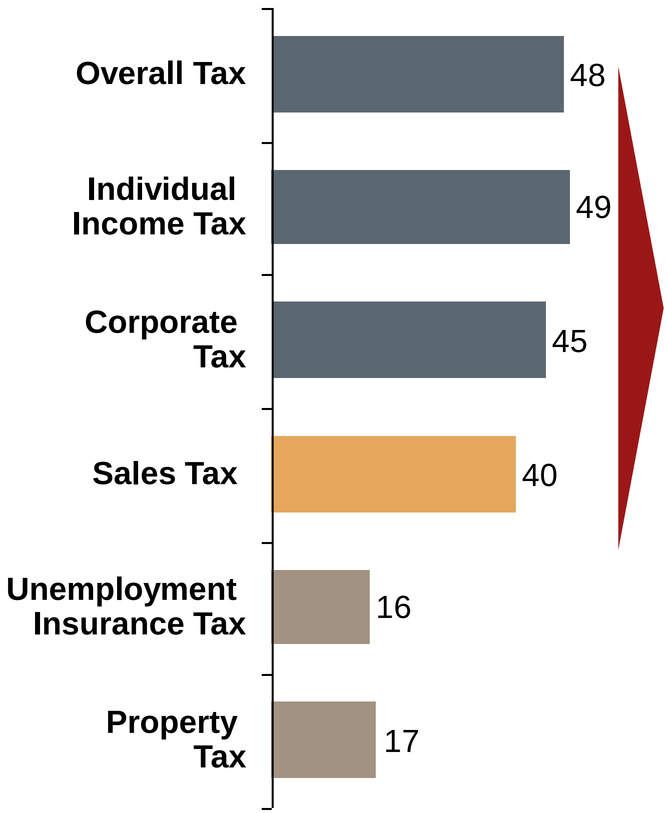
California's tax climate adds to the cost competitiveness challenge

California Ranking in Major Tax Components[2]



State Business Tax Climate Index[1] FY 2013 (1 = Best, 50 = Worst)

1. Tax Foundation's Annual Study
2. California income tax rates are relatively low for low income groups, but high overall

Source: Tax Foundation; A.T. Kearney analysis

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Regulatory compliance leads to lost business, particularly in the space launch and propulsion segments

Environmental Regulations:
Key Findings from Interviews

- Overall, California leads the nation in environmental standards
- Major environmental compliance requirements related to the Space industry are often similar in other states
- Environmental permit/ compliance process in California is stated as more burdensome and time-consuming than other states
- Regulatory compliance often means additional overhead and increased costs of doing business in California

Consequences

- **SpaceX** established its testing facility in Texas as the State was able to move faster on the permit process
- **SpaceX** signed an agreement with Spaceport America (NM) for testing of the Grasshopper re-useable rocket
- **Wyle Labs** has been shifting its new facility investments towards other states
- **L-3 Communications** views regulations as an impediment to upgrading manufacturing processes due to high cost of environmental process qualification (cleaning agents, etc.)

Source: Interviews; A.T. Kearney analysis

Other states are taking an aggressive business development approach to carve out Space industry share

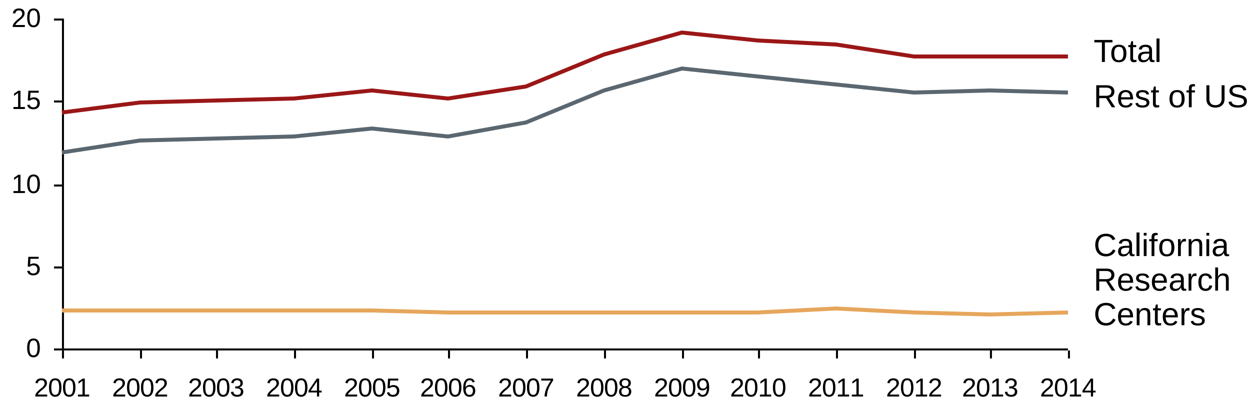
State Policies to Attract the Industry

Florida's Recent Legislative & Business Development Efforts

- **Space Technology Research and Diversification Initiative:** develop multi-university space research and technology programs
- **Space Infrastructure Enhancement Fund:** make a number of space infrastructure improvements
- **Space Flight Contractors/ Tax Refunds**: incentivize qualified players
- **Space and Aerospace Catalyst and Enhancement Act:** provide $15M to 'refurbish a launch complex at Kennedy Space Center'
- **Marketing Programs**: increase visibility (booths at major tradeshows)

Political Support to Compete on Government Spend

NASA Budget by Research Center Location ($B)



California Share of Total NASA Budget: **16%** → **12%**

Source: Florida Senate Web Site; Interviews; California Research Bureau; A.T. Kearney analysis

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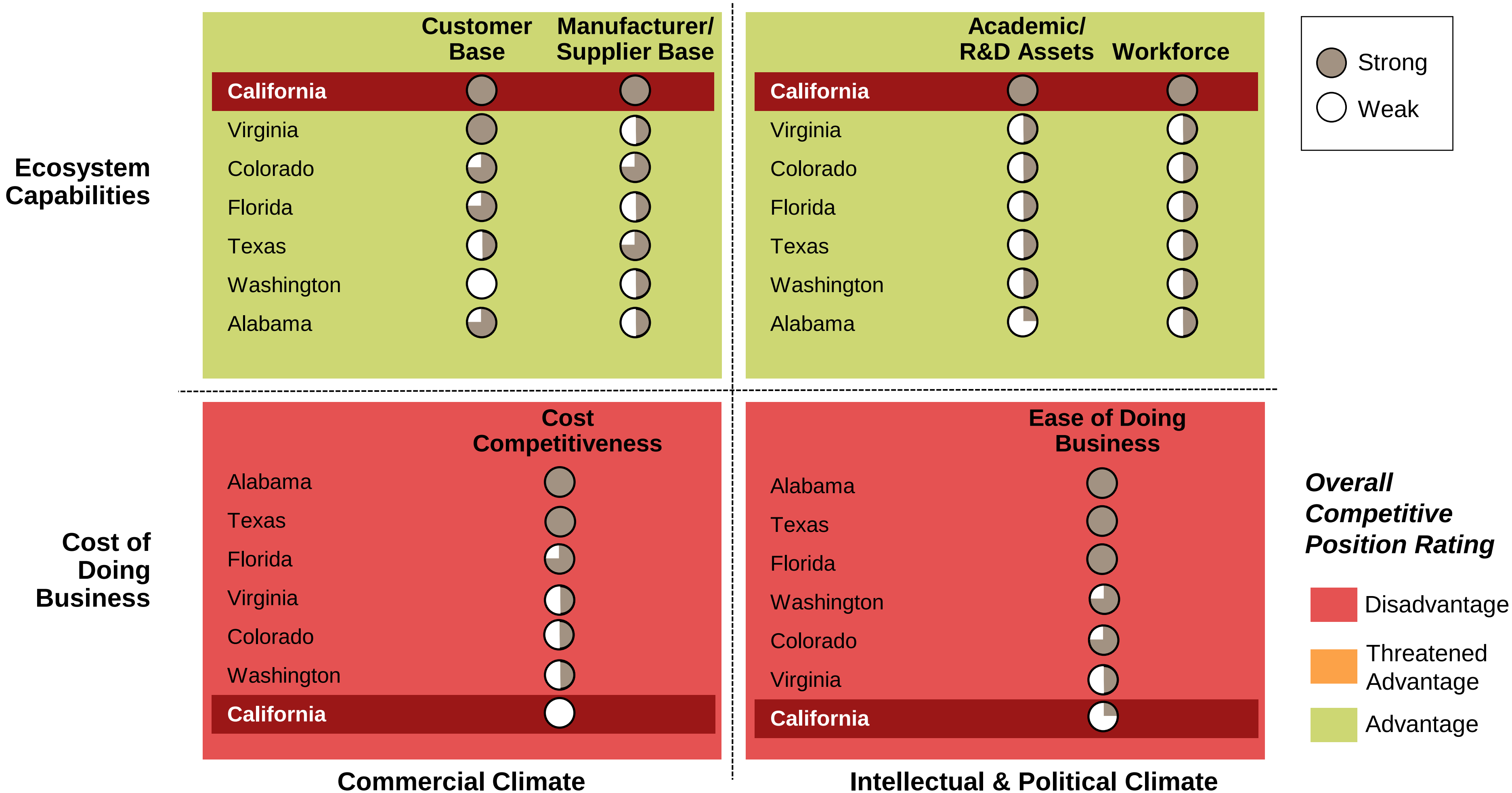
Costs of doing business are eroding California's competitiveness and Space industry ecosystem capabilities

Space Industry Competitiveness Scorecard



Source: A.T. Kearney analysis

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Similarly, for the Aircraft industry, other states have used aggressive tax incentives and marketing approaches

State Comparison – Taxes and Wages

State	Corporate Income Tax[1]	Personal Income Tax[1]	State Business Tax Climate Ranking	Aerospace Average Annual Wage
Texas	1%	None	9	$90,247
Washington	3.3%	None	6	$97,040
S. Carolina	5%	7%	36	$76,887
Florida	5.5%	None	5	$78,344
Kansas	7%	6.45%	26	$72,705
Georgia	6%	6%	34	$79,647
Alabama	6.5%	5%	21	$78,402
California	**8.84%**	**12.3%**	**48**	**$101,192**

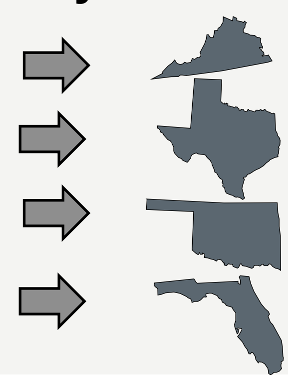
*California is one the most expensive state for Aerospace firms to conduct business

Sample of Recent Marketing Efforts

- The Washington Aerospace Strategy
  – Governor's Office of Aerospace
- Enterprise Florida – Aviation & Aerospace
  – The official economic development organization for the state of Florida
- Texas Aerospace & Aviation Industry Report
  – Office of the Governor – Economic Development and Tourism

Recent/Planned Company Moves

NORTHROP GRUMMAN
Raytheon
BOEING
XCOR AEROSPACE



Virginia
Texas
Oklahoma
Florida

1. Represents statutory tax rates

Source: Enterprise Florida – Aviation & Aerospace; Los Angeles Times; SF Examiner; Daily Breeze News; Examiner.com

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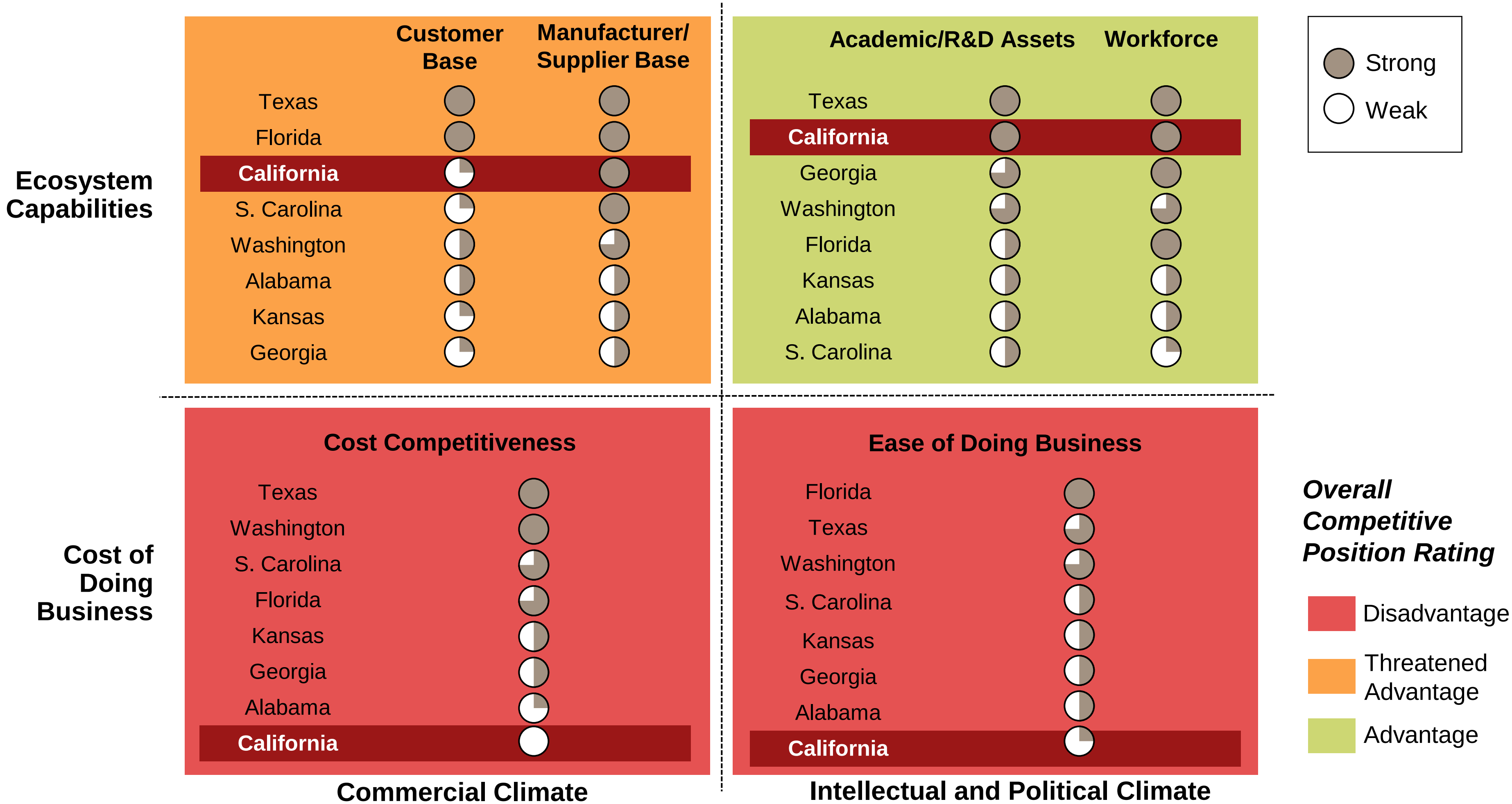
California's aircraft knowledge base remains its greatest asset, but the ecosystems of other states are becoming more viable

Aircraft Industry Competitiveness Scorecard



Source: Enterprise Florida – Aviation & Aerospace; The Washington State Aerospace Strategy; Texas Aerospace & Aviation Industry Report; South Carolina Aerospace; Kansas Aviation Industry: Economic Outlook and Our Future; Georgia.org; Economic Development Partnership of Alabama; A.T. Kearney analysis

Content

- Competitiveness of California in Aerospace Industry
- **Conclusions and Recommendations**

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California has a strong position in the global Aerospace industry, but risks losing this competitiveness without action

Key Conclusions

- California is a global Aerospace leader: in 2012, California generated $61.6B space industry revenues, representing 9% share of a $694B global Aerospace industry and 21% of the $292B U.S. industry. In particular, California leads in the SDNGN Instrument, satellite services, satellite manufacturing, and engineering services industry segments
- The total economic impact of the California Aerospace industry is significant: in 2012, the industry generated 511,000 jobs, $32B in household earnings, and $100B in total economic activity across industries
- California continues to enjoy several sources of competitive advantage: companies with a strong global position, a highly skilled workforce, leadership of major segments, and a concentrated ecosystem of companies that enable opportunities for innovative collaboration
- However, the industry also faces some competitive challenges and weaknesses: anticipated decrease in government spending, tax and regulatory constraints, rising cost of living for the workforce, and high cost of real estate and construction cost that deter commercial investment in the state

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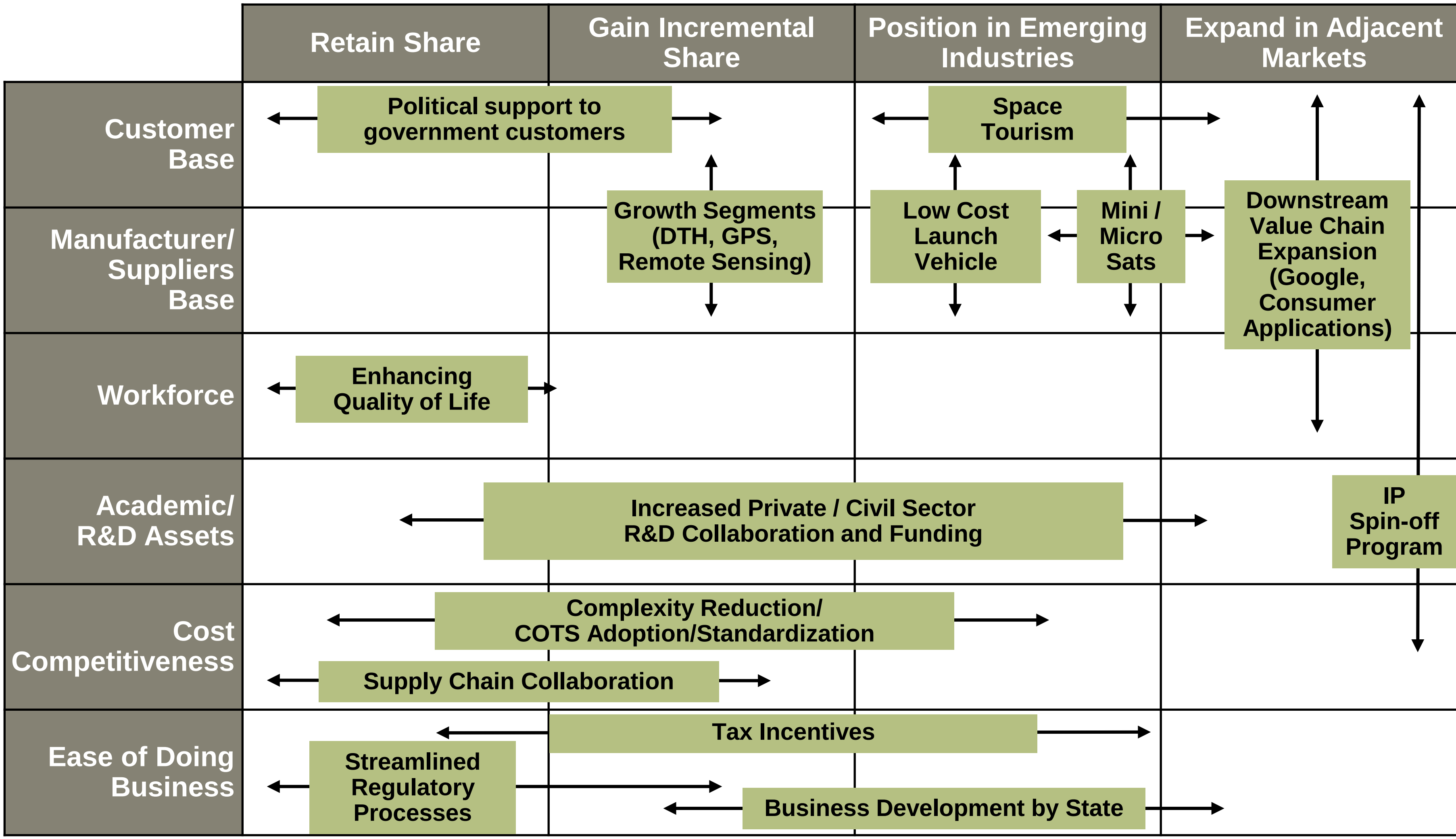
Several actions can be taken by the California State Legislature to prevent further erosion of its Aerospace industry

Recommendations

- Develop incentives
  - Develop economic policies that are competitive with other states to incentivize commercial investment in California
  - Lobby at the Federal level for additional share of government funded work
  - Invest in STEM[1] within schools and universities; attract and retain talent
  - Offer guidance for managing environmental hurdles specific to California
- Relationships with industry
  - Develop reports and brochures to communicate benefits of California
  - Hold workshops and forums to engage industry and show support
  - Attract new businesses by aggressively lobbying industry
  - Support bright spots of the current industry such as unmanned aircraft (e.g., Global Hawk, Northrop Grumman) and airframe structures (e.g., F-18, Northrop Grumman, and 747, Triumph Aerostructures)

Furthermore, there are growth strategies that Aerospace incumbents and start-ups can pursue to support the industry



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For questions and information about this study, you may contact us at:

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