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King County

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King County Aerospace Study

February 10, 2012

Strategic Memo Table of Contents

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The King County Aerospace Context

King County sits at the center of a global and local aerospace industry.

Themes

- King County's and Washington's regional competitive advantage in aerospace is built upon workforce productivity and the efficiency of its current aerospace supply chain
- Global aircraft production capacity is increasing at unprecedented levels due to production rate increases by existing manufacturers and the entrance of new manufacturers into the market
- The rapid need for additional capacity and looming pressures on the aerospace workforce will challenge the extended aerospace supply chain to meet delivery expectations

Observations

- The scale of King County's established workforce and supply chain requires an ongoing, focused effort to build the skills, technology, and capacity the region needs to retain its competitiveness
- While the Puget Sound region has long been at the heart of the global aerospace industry, mechanisms to support public-private aerospace collaboration lag other regions globally
- King County's improvement of aerospace skills and infrastructure must reinforce productivity advantages in today's technologies, while supporting the emergence of the next generation of technologies in aerospace design, fabrication, and assembly

Recommendation Summary

King County can reinforce its existing aerospace advantage while aligning its aerospace cluster and support structure to meet the industry's evolving needs.

Advance: *build new sources of competitiveness for King County*

1. **Extend the aerospace core into new processes and technologies** that build upon King County's experience in aerospace design, aerospace manufacturing, software development, and technology integration through business development and recruitment.
2. **Collaborate with industry, other local governments governments, and the State to maximize regional competitive advantages** in key industry areas through an ongoing effort to understand how other areas of the state can help lower King County's cost profile, augment its workforce, and increase the County's and Washington's overall competitiveness.
3. **Reduce barriers to speed the process of new investment** through a review and streamlining of permitting, land use approvals, and key regulatory and structural issues that may influence future investments in the County.

Reinforce: *extend King County's advantages in workforce productivity and supply chain network efficiency*

4. **Develop coordinated King County preschool to graduate school (P-20) pathways** that reflect industry needs, help generate interest in aerospace, build STEM and problem solving skills at the secondary level, define paths to certification in manufacturing skills, and support additional engineering students and aerospace research at universities
5. **Make coordinated investments in freight and personal mobility** to support the growing flow of material and workers that support in-state aerospace activity and the export of goods to suppliers and manufacturers outside of Washington.
6. **Maintain an ongoing focus to solidify the aerospace core** to retain existing strengths in structures, components, metalworking, and supporting skills that will support the increased production of current aircraft and speed King County firms' transition to new design and production technologies

Advance

1. Extend the aerospace core into new processes and technologies

Extending King County's aerospace advantage will depend upon establishing early leadership in emerging processes and technologies.

Because King County's future aerospace advantage depends on its ability to be productive, efficient, and of the highest quality, its companies must extend their existing base of experience into new and emerging aviation and space processes and technologies. This effort will require both research and development in existing companies, the nurturing of new companies, and the select recruitment of companies currently not in the County. Areas such as advanced materials, avionics, and software development can augment the region's existing strengths in components, structures, and assembly.

Recommendation Rationale

- The retention of King County's productivity, workforce, and quality advantages requires early investment in the next generation of aerospace design and technologies
- Washington is a world leader in many high technology areas, particularly software, yet even as software, data, and avionics gain in importance in aviation, the firms that develop these technologies are relatively under-represented in Washington
- King County firms working in components, consumables, fabrication, and structures have the opportunity to develop an early competitive advantage in new materials and technologies

Specific Actions

- Work with the State and industry to support skill development and investment within the current industrial base targeted at new material and production technologies
- Work through enterpriseSeattle to target and attract new firms in areas currently outside of the County's aerospace core, e.g. advanced materials, avionics, aerospace software development, and systems (e.g. brake, power, etc.)
- Use King County Aerospace Alliance (KCAA) to engage the aerospace, software, and venture capital sectors to spot new opportunities, fund investment in local companies, and support the recruitment of new companies to Washington and King County

Advance

2. Collaborate with industry, other local governments, and the State

Aerospace companies across Washington can compliment and strengthen the King County aerospace industrial base.

King County can collaborate with industry and other jurisdictions across Washington to support King County's aerospace core by identifying how other areas of the state can help lower King County's cost profile, augment its workforce, and increase the County's and the State's overall competitiveness. In addition to identifying potential partnerships to support joint design and manufacturing opportunities that can reduce cost and risk to companies in King County, such collaboration can also help influence policy on questions such as freight and workforce mobility and pertinent regulations.

Recommendation Rationale

- King County's aerospace industry concerns, from workforce development, to transit, to infrastructure, to freight mobility are shared not only by its immediate neighbors in Snohomish and Pierce Counties, but impact aerospace suppliers across Washington
- With state and federal funds constrained for the foreseeable future, coordinated lobbying and pooling of resources may be required to pursue needed projects
- Other parts of Washington present lower cost to build and operate large scale manufacturing sites and can serve King County at minimal cost, but can benefit from the design, development, and specialized manufacturing expertise of King County

Specific Actions

- Engage with public and private sector leaders and aerospace affiliations such as the WAP to identify, lobby for, and implement shared priorities across aerospace workforce development, infrastructure, and specific state and federal policies and funding that impact the industry
- Engage with industry groups to facilitate the development of relationships between King County businesses, particularly small and medium businesses, and those in other portions of the state to support skill development, capacity growth, new business development, and other emerging topics

Advance

3. Reduce barriers to help speed the process of new investment

Local jurisdictions in King County can work with the State and industry to reduce the time and cost to approve and complete industrial projects.

While maintaining the essential character of the Puget Sound region, local jurisdictions in King County can work with the State and industry to implement measures to speed and provide greater certainty regarding the process for siting, approving, completing and operating industrial projects. Together, they can work to develop more streamlined and consistent land use and permitting processes, seek water quality standards, increase the predictability and transparency of land use approval, increase certainty of investments needed to clean-up historic contamination, convene comprehensive discussion of flood risk and risk tolerance, and identify key regulatory and structural issues that may influence future investments in the County.

Recommendation Rationale

- Interviews with industry, municipalities, and the County demonstrate a shared recognition that the permitting process for new construction and existing sites can be made more efficient to reduce time and cost for both applicants and administrative agencies
- Storm water permitting and uncertainty about scope and cost of cleaning up historic contamination in some areas remain significant topics of focus for industry as it makes decisions regarding investment in existing or new facilities in the County
- Flood control on the Green River has improved, but uncertainty persists between business, government, and insurance industry as to how to appropriate cost any remaining flood risk

Specific Actions

- Work with industry, other counties, the state, and federal representatives to reduce permitting redundancies and inefficiencies and create a roadmap for permitting across jurisdictions
- Engage with industry and Ecology on industrial storm water standards focused on water quality at a watershed scale, particularly in industrial areas with high background contamination
- Convene cities, industry representatives, FEMA, and insurers to develop a more comprehensive framework for flood risk assessment and tolerance; share approaches for meeting new FEMA standards for flood hazard regulations under ESA
- Continue to lead efforts that improve total cost competitiveness, e.g. measuring the cost and effectiveness of health care delivery in the Puget Sound.
- Continue to work with the Lower Duwamish Work Group on river clean-up alternatives that achieve outcomes quickly and with least disruption to community, economy, and health.

Reinforce

4. Develop a coordinated King County P-20 workforce pipeline

King County's aerospace advantage primarily rests in the productivity and innovative thinking of its workforce.

The Workforce Development Council, Seattle-King County, school districts, and higher education can work with industry to develop a coordinated P-20 aerospace workforce pathway to generate interest in aerospace careers, develop STEM and problem solving skills at the secondary level, defining pathways to certification in aerospace skills, and support capacity at four year institutions for engineering talent and aerospace research. Such a pipeline should also consider the growing diversity of King County and how the public schools and training programs can best serve these populations and ignite interest in aerospace.

Recommendation Rationale

- The efficiency and productivity of Washington's workforce are critical to Washington's and King County's ongoing competitiveness, but a large portion of its workforce will retire over the next five years, even while production rates increase across the industry
- Washington's universities do not produce enough engineers and research to meet aerospace industry needs; Washington is a significant importer of engineers
- King County's community and technical colleges are primary providers of technical training in advanced manufacturing and aeronautics for the region's diverse population, including many who require training in both basic and technical skills

Specific Actions

- Workforce Development Council, Seattle-King County (WDC) can work with K-12, community and technical colleges, state universities, and industry to define standard pathways, curricula, and training for specific aerospace careers
- The KCAA can work with state universities on programs and advocacy for funding industry-relevant engineering teaching and research capacity (e.g. materials, production, biofuels)
- School districts and WDC can support and implement K-12 programs that build STEM skills, engage diverse communities in career pathways, and secure high school aerospace grants
- WDC can work with community and technical colleges to identify centers of excellence for specific manufacturing skills and align funding to those centers

Reinforce

5. Make coordinated investments in freight and personal mobility

The efficiency of Boeing facilities and global suppliers in King County depends on the efficient movement of material and people.

KCAA can advocate with the State and municipalities to prioritize and fund investments in freight and personal mobility to support the flow of material and workers for in-state aerospace activity and the export of goods to companies outside of Washington. The top priority for roads infrastructure is improvements to the I-405/SR 167 corridor, but SR 509 also helps port mobility. Transit plays an equally important role in managing congestion during peak hours. Extension of the F-line Rapid Ride to Renton is critical, but stable funding for transit in general is important to keeping the region moving and serving workers.

Recommendation Rationale

- Higher aerospace production rates will lead to the greater flow of material and workers across the Puget Sound region, especially in King County
- Industry and municipalities are focused on freight mobility, but particularly in the context of managing increased freight movement alongside the use of mass transit to support a growing volume of workers working and travelling across the County
- The Port of Seattle plays a central role in the movement of goods into manufacturing facilities, both through SeaTac and also in the distribution of spare parts to support global aerospace operators

Specific Actions

- Pursue funding for infrastructure investments that impact movement through King County such as I-405, SR-167, SR-509
- Support stable funding for transit to relieve congestion and allow for improvements that will serve aerospace workers better. Extending the F-line Rapid Ride corridor to Renton is a top priority.
- Coordinate with other areas of the state to support projects that will improve freight mobility through the Pierce to Snohomish County “aerospace highway” and across I-90 from key locations in eastern Washington to the Puget Sound

Reinforce

6. Solidify the existing aerospace core

King County must continue to support the skills and structure that support its existing manufacturing strengths.

The KCAA can work on an ongoing basis with industry, workforce development agencies, and economic development agencies to solidify its existing strengths in structures, components, aluminum metalworking, logistics, and final assembly that will be essential to support rate increases across all commercial airplane programs including the 737 NG**,** 737 MAX, A320, and Boeing widebodies. Maintaining these skills will also help King County companies to quickly make the transition to the use of new materials and the blending of materials – carbon fiber, aluminum, titanium, etc. – as they grow in importance in aircraft fabrication and assembly.

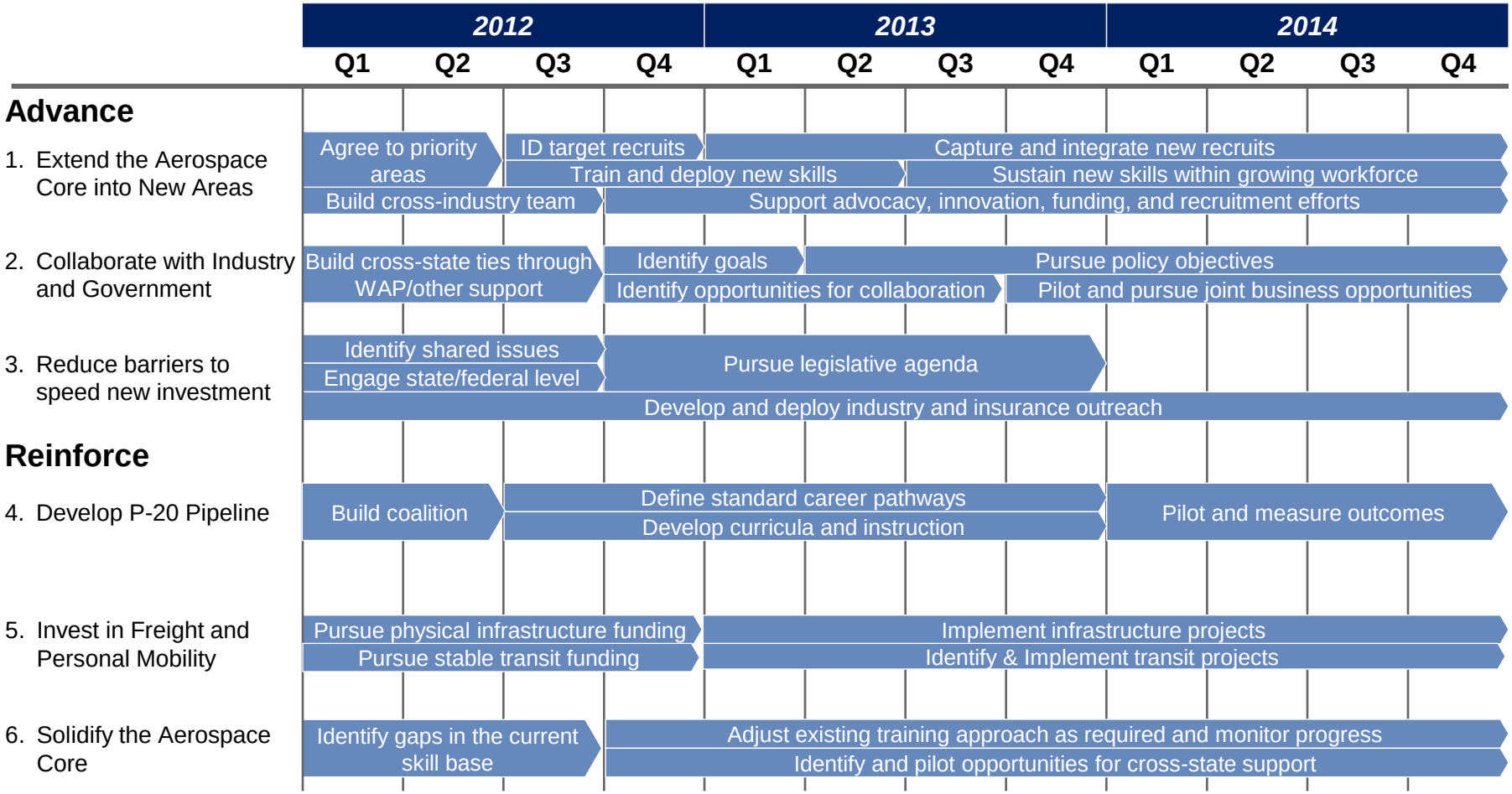
Recommendation Rationale

- Rate increases on the 737NG and the decision to produce the 737 MAX rather than a "New Small Airplane" ensures that current manufacturing, component, and structural technologies will continue for at least the next decade
- Advances in aluminum technologies may make aluminum a viable alternative and competitor to carbon fiber for next-generation, single-aisle narrowbody aircraft
- Materials technology, particularly the blending of metallic and non-metallic material, is of increasingly important value across many aerospace components and structures

Specific Actions

- Coordinate through the Workforce Development Council, Seattle-King County (WDC) to identify potential skill gaps in the existing manufacturing core of structures, components, etc. and address those gaps
- Collaborate with industry, the WDC, and workforce training entities to ensure that training meets industry's skill needs as it balances incorporating emerging technologies (e.g. carbon fiber, systems) with maintaining a solid foundation in existing fabrication technologies
- Collaborate with other areas of the state to build an aerospace network that takes advantage of differing cost structures and technologies across the state

Suggested Phasing of Recommendations



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Glossary

Term/ Acronym	Definition
737 MAX	Boeing's newly announced derivative to the existing 737NG (see below) that will provide increased fuel efficiency and other benefits to aircraft operators and passengers
737NG (New Generation)	Boeing's most current production derivative of the 737 aircraft which will be succeeded by the 737 MAX
A320	Airbus's competitor to the Boeing 737
A320NEO	Airbus's "new engine option" derivative of the A320 providing increased fuel efficiency, competing against Boeing's 737 MAX
Aerospace Joint Apprenticeship Committee (AJAC)	Aerospace and manufacturing apprenticeships providing occupational skills training that combines on-the-job training with classroom instruction
B&O Revenue	Business and operations tax revenue collected by the state and local municipalities
B737	Boeing 737, single aisle aircraft
Backlog	Refers to the existing order book of an aircraft manufacturer
BLS	Bureau of Labor Statistics
Economic Factors	Assessment element used to analyze the relative aspects of competitive state economies (e.g. access to financing, capital, state budget, etc.)
EDC	Economic development council/ corporation
Education, Training, and Social Institutions	Assessment element used to analyze the state's educational and workforce development systems (e.g. higher education institutions, workforce development programs, K-12, etc.)
enterpriseSeattle	formerly known as the Economic Development Council of Seattle and King County, is a 39-year-old public-private economic development partnership that provides consulting services, to individual businesses seeking to establish, expand or relocate to King County and its 39 cities
Final Assembly (FA)	The completion of a manufacturing process when the finished product is put together and readied for delivery to the final buyer
Metropolitan Statistical Area (MSA)	Geographic entities defined by the Office of Management and Budget for use by federal statistical agencies for collecting, tabulating, and publishing federal statistics
NAEP	National Assessment of Educational Progress
OEM	Original equipment manufacturer (e.g. Boeing or Airbus), sometimes referred to as OEIs or original equipment integrator
Operators	Passenger and freight airlines, customers of aircraft manufacturers
P-20	Pre-school through "grade 20"
Physical Infrastructure	Assessment element used to analyze the physical assets of competitive states (e.g. freight airports, road, rail, seaports, etc.)
Platform	Represents a product or series of products (e.g. 737, 777, etc.) often used to refer to an aircraft model (e.g. 737, 777, etc.) or software release (e.g. Windows 7, etc.)
Political Climate	Assessment element used to analyze the relative "business friendliness" of the state toward manufacturing operations, with a focus on aerospace (e.g. industry incentives, labor rules, etc.)
Fleet Availability Service Model/ Power by the Hour	Service offering based on asset availability versus paying for maintenance in a transactional, break-fix model. Most commonly provided by aircraft engine manufacturers where airlines pay for a service availability or "up-time" versus individual parts or service jobs
STEM	Science, technology, engineering, and math
Supply Chain Network	Assessment element used to analyze the state's fit within the existing supply chain (e.g. manufacturing network, logistics cost, etc.)
SWOT	Strengths, Weaknesses, Opportunities, and Threats analysis
Systems	Aircraft systems such as including electrical, hydraulics, fuel, propulsion, navigation, flight controls, and HVAC.
Total Landed Cost Model (TLC)	The total cost of manufacturing and delivering an aircraft or product to a customer.
Workforce	Assessment element used to analyze the existing workforce (e.g. demographics, manufacturing experience, aerospace experience, skill mix & quality, wage rates, etc.)

Contents

Project Objectives

Identify Steps for King County to Strengthen its support of the aerospace industry

Building upon the initiatives identified by the Washington Aerospace Partnership assessment, the project will detail opportunities for King County

King County Request	Our Approach
• Identify key sources of competitiveness to keep and grow the County's aerospace cluster	• Create King County profile across the identified drivers of aerospace competitiveness
• Analyze King County's strengths, weaknesses, opportunities and threats (SWOT) in supporting the aerospace industry	• Identify municipalities and other organizations that possess significant components supporting the aerospace cluster in the County
• Identify aerospace suppliers in King County	• Develop consolidated data set of King County suppliers and capabilities
• Identify competencies within existing within King County and recommend new competencies to develop/ acquire	• Identify opportunity areas across the phases of an aerospace program
• Evaluate the supply chain network for aerospace companies as it relates to King County and provide recommendations how the County can capitalize upon relevant opportunities	• Provide insight into "total landed cost" model built during Washington Aerospace Partnership (WAP) assessment to understand the potential cost drivers of manufacturing the 737 MAX in King County
• Recommend how King County should continue to support the industry	• Work with King County to develop recommendations based on findings

Approach and Opportunity Development

Confirm approach & objectives, prepare assessment

Gather and analyze county and municipal data

Analyze the aerospace supply chain within King County

Develop & detail King County opportunities

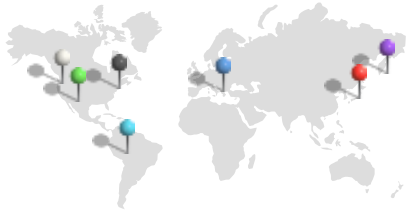
Review assessment objectives

- Objective 1
- Objective 2
- Objective 3
- Objective N

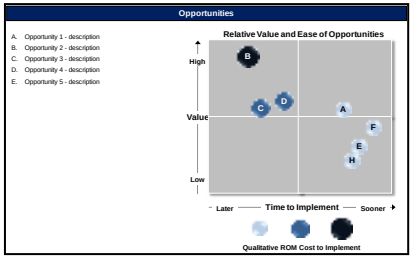
Conduct internal and external research; aggregate data

		Washington		Alabama	
Economic Factors		Status	Owner	Status	Owner
	Access to finance, capital	Not Started		Not Started	
	Insurance, liability	Not Started		Not Started	
	Land availability, pricing	Not Started		Not Started	
	Prevailing wages	Not Started		Not Started	
Education, Training, Social Institutions					
	Demographics	Not Started		Not Started	
	Higher education	Not Started		Not Started	
	Quality of life indications	Not Started		Not Started	
	Taxation	Not Started		Not Started	
Physical Infrastructure					
	Airports	Not Started		Not Started	
	Rail	Not Started		Not Started	
	Road	Not Started		Not Started	
	Seaports	Not Started		Not Started	

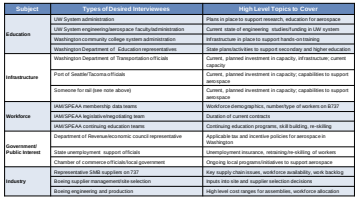
Collect King County supply chain data



Create high level value case

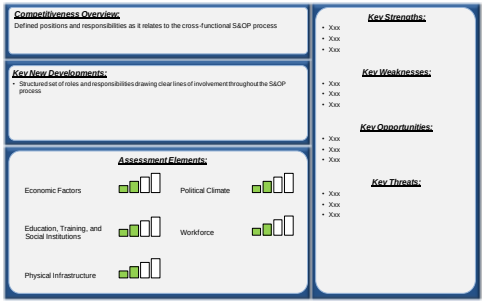


Develop data & interview requests

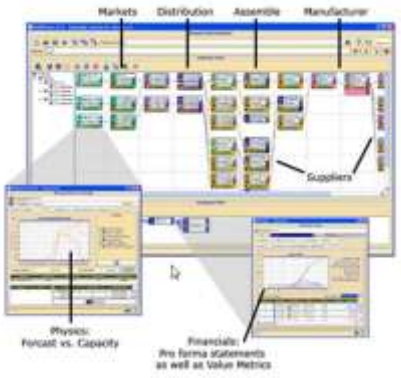


Subject	Types of Desired Interviewees	High Level Topics to Cover
Education	UW System administration	Plans in place to support research, education for aerospace
	UW System engineering/aerospace faculty/administration	Current state of engineering student/funding in UW system
	Washington community college system administration	Infrastructure in place to support hands-on training
	Washington Department of Education representatives	State plans/activities to support secondary and higher education
Infrastructure	Washington Department of Transportation officials	Current, planned investment in capacity, infrastructure, current capacity
	Port of Seattle/Tacoma officials	Current, planned investment in capacity; capabilities to support aerospace
	Someone for rail (see note above)	Current, planned investment in capacity; capabilities to support aerospace
Workforce	IAM/SPEAA membership data teams	Workforce demographics, number/type of workers on 8737
	IAM/SPEAA legislative/negotiating team	Duration of current contracts
	IAM/SPEAA continuing education teams	Continuing education programs, skill building, re-skilling
Government/ Public Interest	Department of Revenue/economic council representative	Applicable tax and incentive policies for aerospace in Washington
	State unemployment support officials	Unemployment insurance, retraining/re-skilling of workers
	Chamber of commerce officials/local government	Ongoing local programs/initiatives to support aerospace
Industry	Representative SMB suppliers on 737	Key supply chain issues, workforce availability, work backlog
	Boeing supplier management/site selection	Inputs into site and supplier selection decisions
	Boeing engineering and production	High-level cost ranges for assemblies, workforce allocation

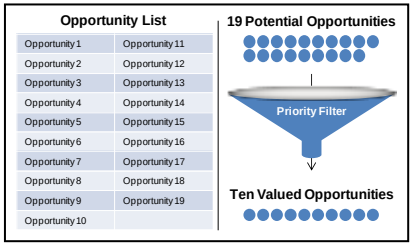
Develop municipal profiles & SWOT analysis



Summarize King County total landed cost components

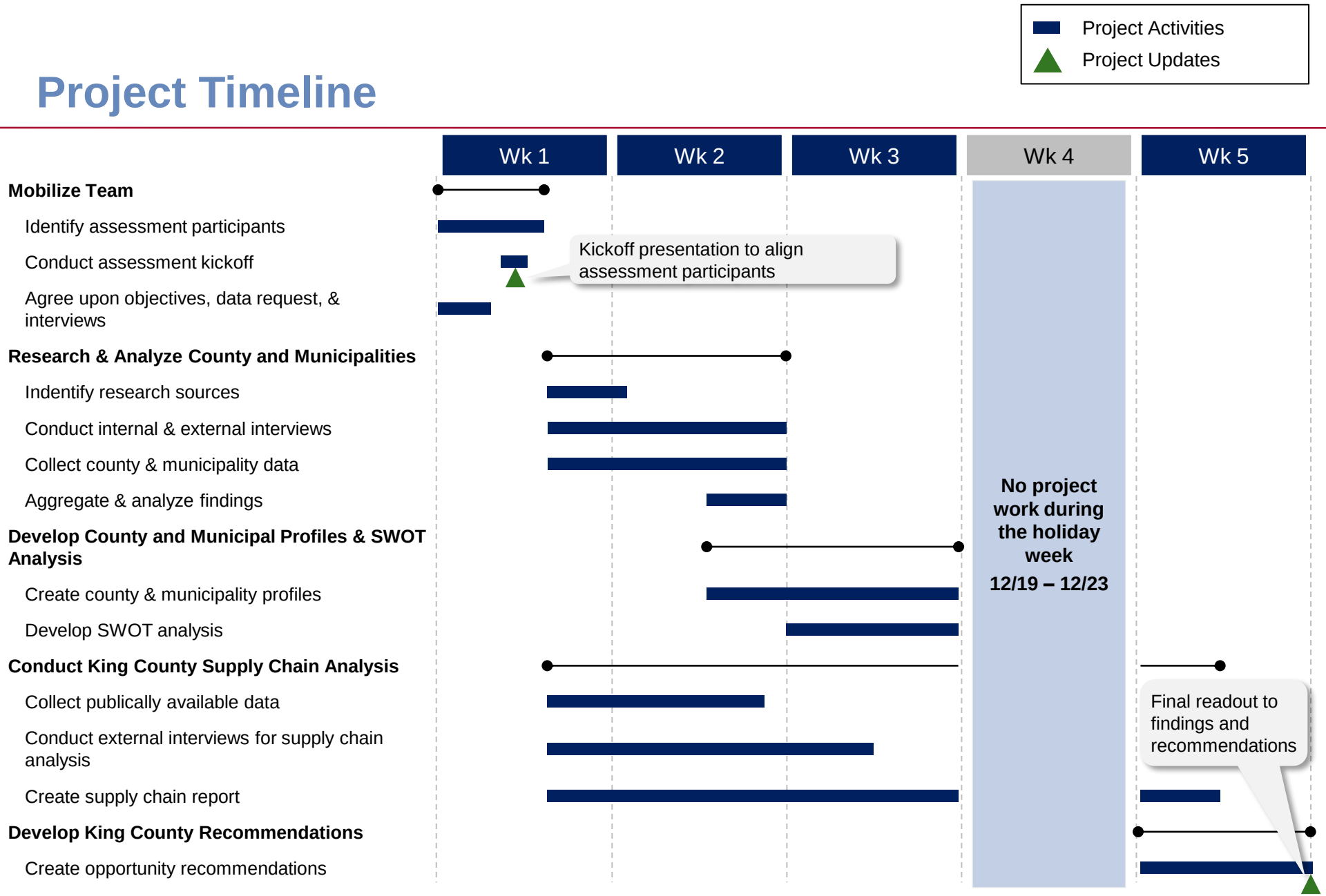


Develop list of high-priority opportunities



EXAMPLES ILLUSTRATIVE

Project Timeline



Project Scope Considerations

To meet the King County's timeline, the project focused on a defined scope of municipalities and supporting institutions.

Municipalities

- Seattle
- Renton
- Kent
- Auburn
- Bellevue
- Tukwila
- Federal Way

King County Government

Port of Seattle

enterpriseSeattle

Supporting Institutions

- Bellevue College
- Lake Washington Institute of Technology
- North Seattle Community College
- Renton Technical College
- Seattle Central Community College
- Shoreline Community College
- South Seattle Community College
- Green River Community College
- University of Washington
- Washington State University
- Public School Districts (K-12)
- State Board for Community & Technical Colleges
- enterpriseSeattle
- Workforce Development Council, Seattle-King County
- Apprenticeships

Sources of Positioning and Competitiveness

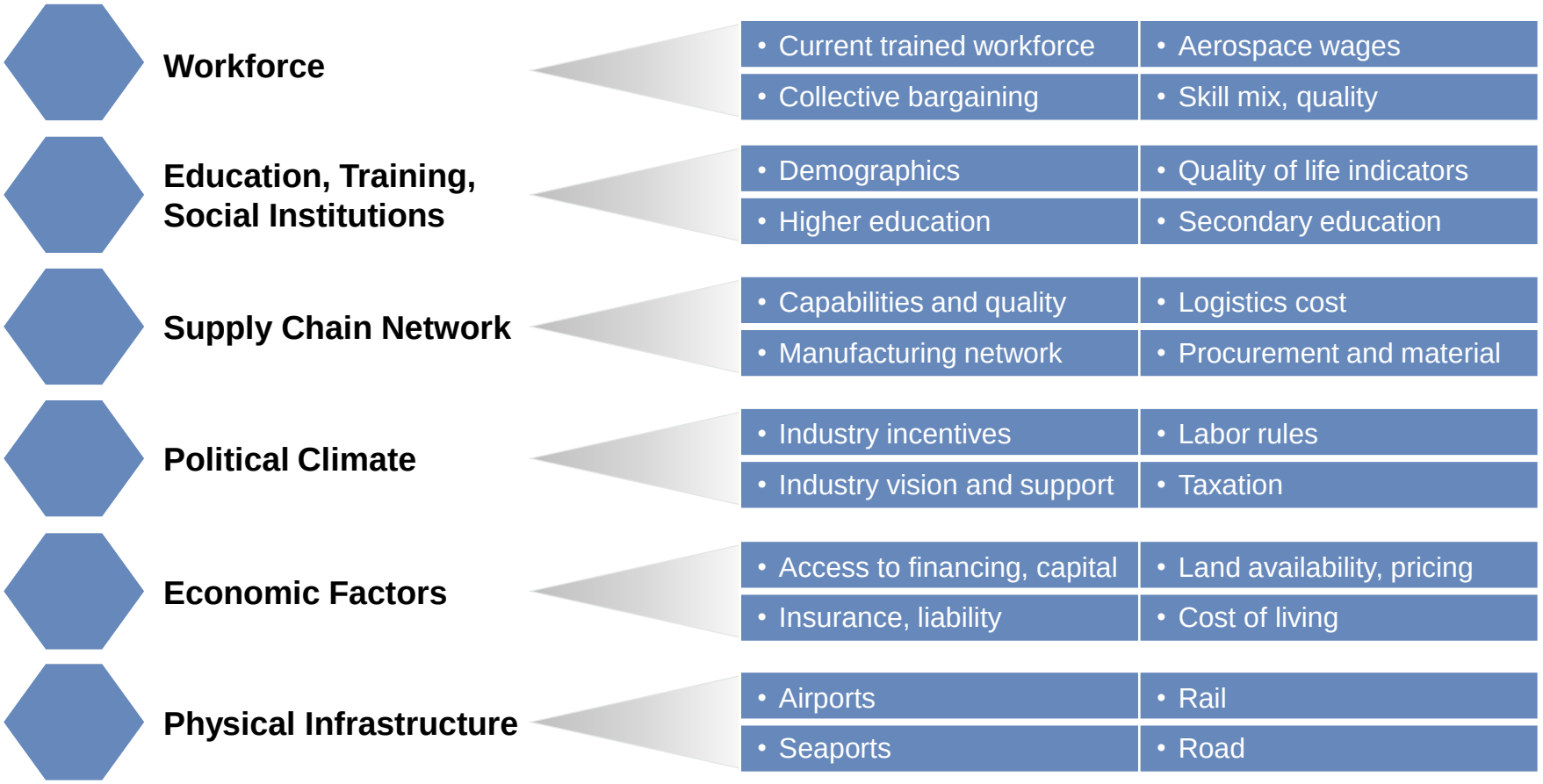
Qualitative Analysis

The qualitative analysis of King County is based on six factors that influence manufacturing and aerospace competitiveness.

- **Workforce:** the quality, quantity, and cost of workers in focus industries
- **Educational and Training Institutions:** the relative strength of K-12 schooling, community and technical colleges, universities, and apprenticeship programs
- **Supply Chain Network:** the relative advantages provided by existing manufacturing facilities and supporting suppliers in a given region
- **Political Climate:** the degree of direct and symbolic state and local governmental support for industry
- **Economic Factors:** the ability to gain access to financing and manage costs in a given area
- **Physical Infrastructure:** the roads, rail, airport, seaport, and utilities in place to support industry

Qualitative Research Area Examples

The qualitative analysis examined a wide range of data across King County.



King County Stakeholder Interviews

We spoke with nearly 70 individuals representing 33 organizations to understand how King County is currently approaching aerospace competitiveness.

Organization	Organization	Organization
Aero Law Group	Green River Community College	Renton Municipal Airport
Auburn School District	Highline School District	Renton School District
City of Auburn Economic Development Department	Kent School District	Renton Technical College
City of Bellevue Mayor's Office	King County Dept of Natural Resources and Parks	State Board for Community and Technical Colleges
City of Federal Way Economic Development Department	King County Dept. of Transportation	Shoreline Community College
City of Kent Economic Development Department	King County Office of Economic and Financial Analysis	South Seattle Community College
City of Renton Economic Development Department	King County Office of Performance, Strategy, and Budget	The Boeing Company
City of SeaTac Economic Development Department	Lake Washington Institute of Technology	University of Washington
City of Seattle Economic Development Department	North Seattle Community College	Washington State University
City of Tukwila Economic Development Department	Olympic Aerospace	Workforce Development Council, Seattle-King County
enterpriseSeattle	Port of Seattle	

Report Contents

The report seeks to understand the potential of the aerospace industry in King County in the context of commercial aviation market trends.

Commercial Aviation Market Context	The market factors that are influencing the industry
Assessment Framework	Analysis structure to define industry needs and King County opportunities
Existing Aerospace in King County	Review of the current state of the aerospace industry in King County including key statistics and SWOT analysis
King County Opportunities in Aerospace	Potential opportunities for investment to develop new or maintain existing core competencies

Contents

Market Context: Executive Summary

Themes

- Commercial aircraft operators are urgently looking for new aircraft to support growth in new markets and increase operating efficiency
- The aerospace workforce is in transition, with a significant number of production and professional workers moving toward retirement over the next five years
- There is an ongoing shift in the aviation services business away from “break fix” repair to long term support contracts based on aircraft performance data and analytics

Observations

- The demands of aircraft operators will place increasing pressure upon manufacturers to deliver new aircraft on-time and to performance expectations
- Those manufacturers and locations that have an advantage in current manufacturing skills technologies will seek to secure their existing knowledge base while moving forward to extend that advantage into emerging skills and technologies
- Workforce development and research into more efficient product development and production methods are at the head of the industry agenda

The Commercial Aerospace Industry Ecosystem

Companies in King County work across the aerospace industry ecosystem.

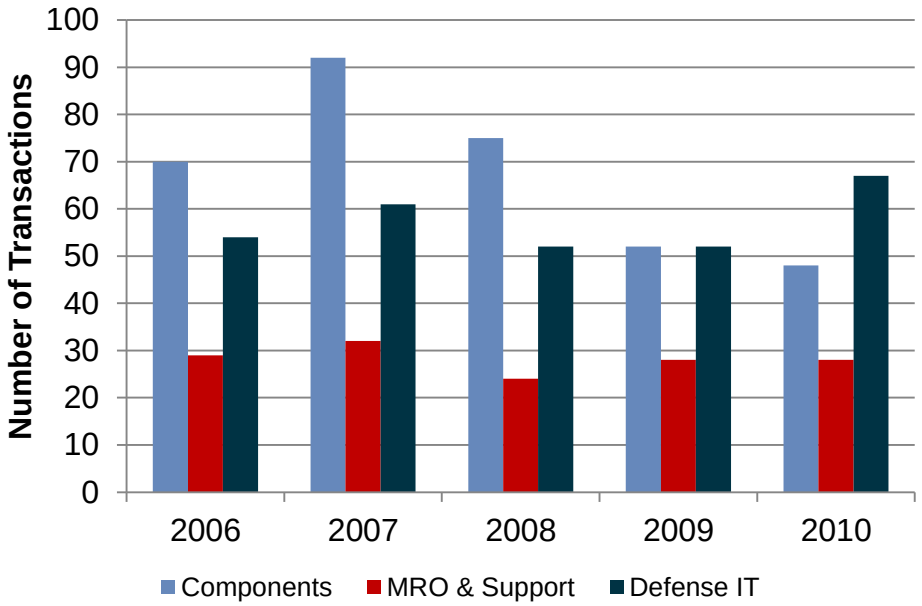
Suppliers	Original Equipment Manufacturers (OEMs)	Maintenance, Repair and Overhaul (MRO)
Value Added Services	Suppliers, OEMs, and MRO providers are all working to provide lucrative "full life cycle" support services to aircraft operators to support aircraft availability and revenue generation.	
• Range from providers of major assemblies (e.g. fuselage, engines) to niche providers (e.g. machine shops) • Larger suppliers engaged in collaborative design with OEMs	• Companies with primary responsibility for the design, final assembly, and test of an aircraft • Manage contracts and relationships with suppliers and operators	• Companies originally focused on maintenance of airplane structures and power plants • MRO companies are increasingly moving to provide value added services

Global Industry View: Suppliers

The ability of suppliers to scale could be a significant constraint upon OEMs' ability to ramp production to meet customer demand.

- There has been significant consolidation and contraction of the aerospace supply base resulting from the post-9/11 contraction of the airline industry and the continued restructuring of the defense industrial base
- The subsequent reduction in capacity that emerged from the disappearance and redundancy of companies has created a lean supply chain and diversified the customer base of many smaller suppliers
- However, the rapid growth of commercial aerospace orders will place significant strain upon the supply base to accelerate in line with both OEMs and Tier One suppliers
- Supplier availability and capacity will be an ongoing constraint

Signs of Consolidation: North American Aerospace and Defense Merger and Acquisition Activity

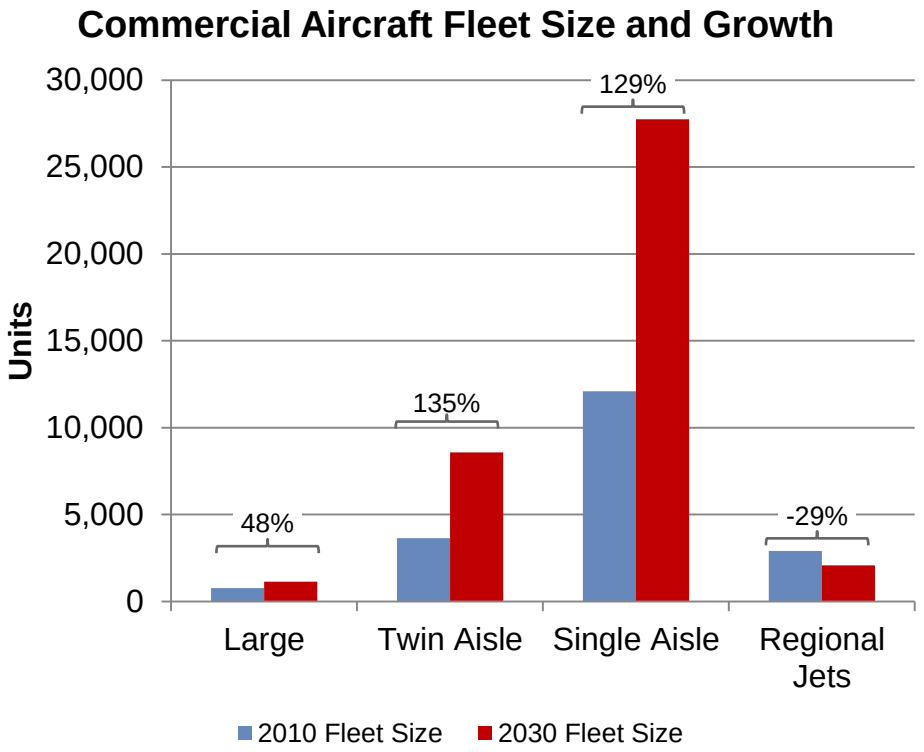


Source: Grant Thornton

Global Industry View: Original Equipment Manufacturers

While market watchers are focused on the potential for an aviation bubble, most look for emerging market demand and fleet renewal in mature markets to lead to the expansion of commercial aircraft fleets.

- Significant growth in passenger travel in emerging markets in Asia and the Middle East will drive fleet expansion, particularly for single aisle aircraft
- The need for carriers in North America and Europe to improve the fuel efficiency and operating costs of their fleets will be another significant source of new orders
- Airline and cargo customers require certainty of delivery for new orders to achieve their financial targets, regardless of issues in manufacturing, workforce, or supply
- The rise of new competitors will capture market share and exert price pressure on Airbus and Boeing, particularly in the single aisle market

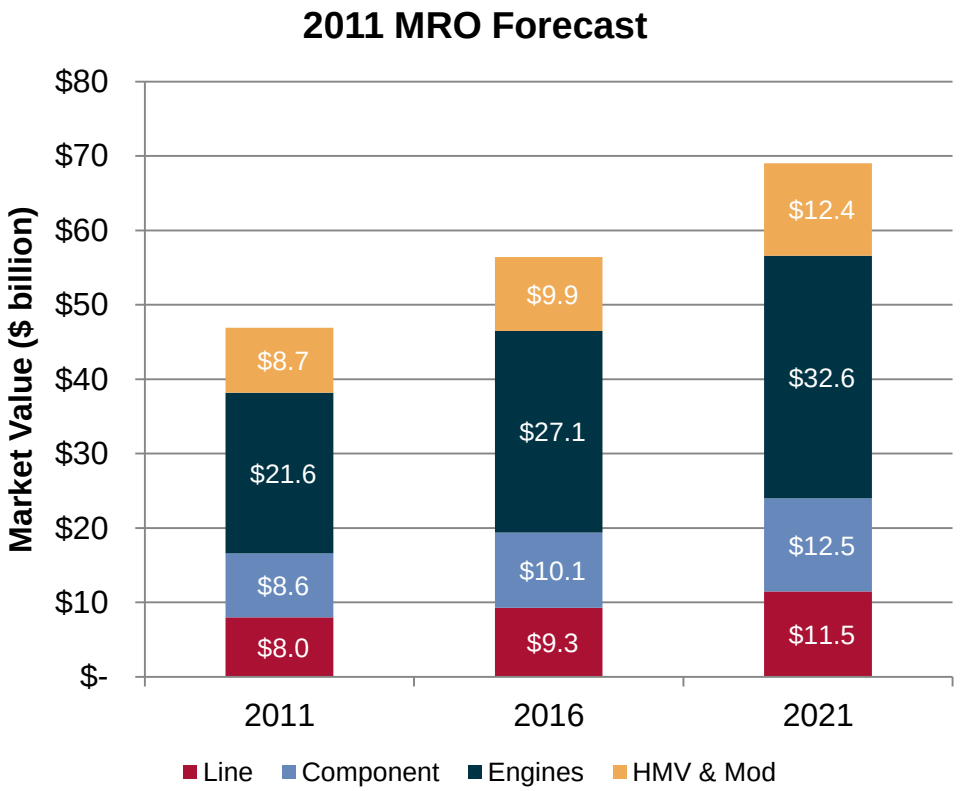


Source: Boeing, Accenture research

Global Industry View: Maintenance, Repair, and Overhaul

The market for traditional maintenance, repair, and overhaul services will grow along fleet growth and fleet utilization.

- While some airlines such as Delta and Lufthansa retain maintenance arms, most work with third party MRO companies
- Engines generate the most growth, revenue, and margin in the MRO segment, while most line maintenance and component maintenance are viewed as commodity, cost driven services
- Most MRO providers seek growth through minimizing their costs (especially labor) and finding means to create value for airline customers
- Led by engine service providers, MROs are increasingly investing in technology and operational scale to provide a suite to services to "sell" aircraft uptime and availability to customers versus charging for a specific maintenance event



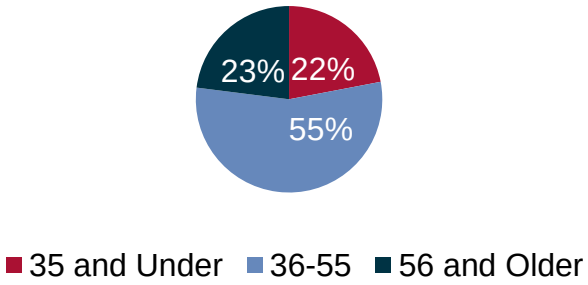
Source: SAI

Global Industry View: Workforce

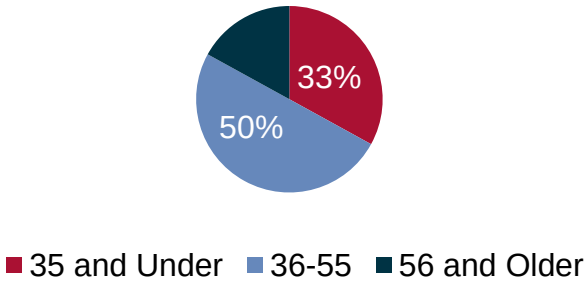
The ability to efficiently and affordably replace an aging workforce, while retaining its knowledge is a critical challenge for the industry.

- The industry faces a demographic shift as a massive number of professional and production workers will retire in the next five years
- Attracting younger workers is increasingly difficult due to competition from other industries and funding uncertainties, particularly on the defense side of the business (for professionals)
- Many states are building programs to train the next generation of production workers
- Professional skill needs vary by company size and focus, but include:
  - Aerospace Engineering
  - Enterprise IT
  - Mechanical Engineering
  - Program Management
  - Software Development and Engineering
  - Systems Engineering

Age Distribution – Companies with Over 50,000 Employees



Age Distribution – Companies with Fewer than 1,000 Employees



Source: Aviation Week and Space Technology. August 22, 2011

Source: 2011 Aviation Week Workforce Study

Contents

Aerospace Program Lifecycle Overview

Major programs move through four major phases during their lifecycle, each having distinct characteristics, supply chain implications, and requirements.

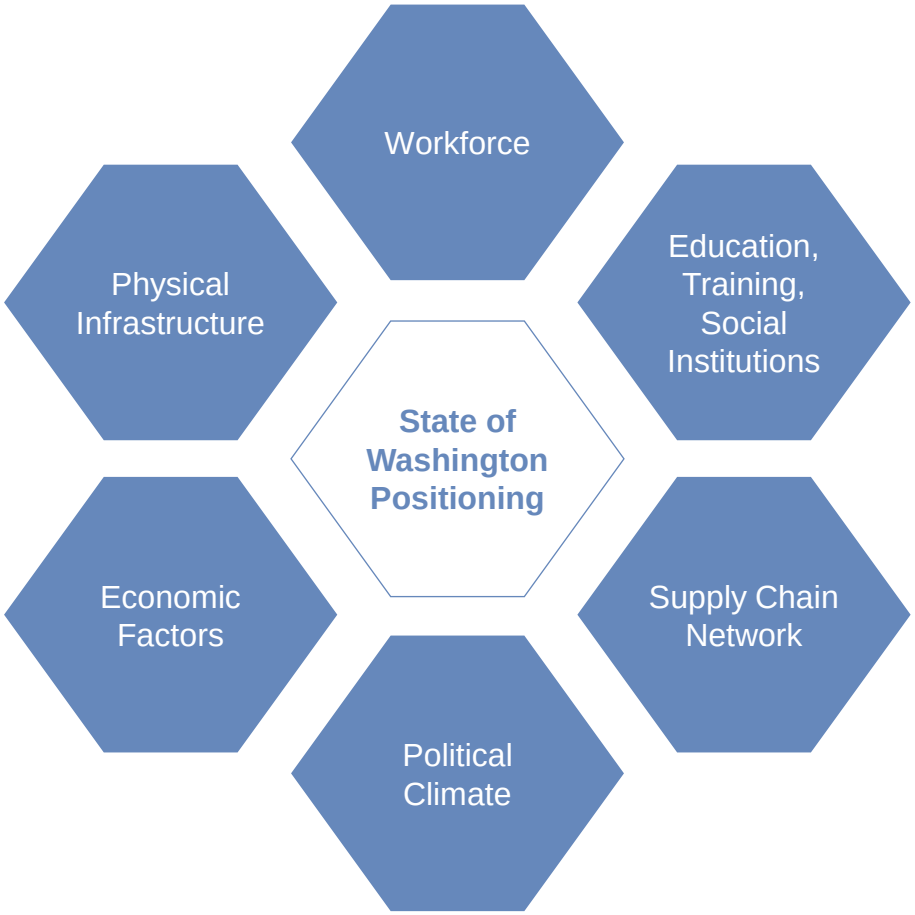
Program Lifecycle

Concept	Design	Build	Service
Example Activities of Phase			
• Mock-ups (3D software) • Rapid prototyping • Research & development (R&D)	• Modeling (physical and virtual) • Simulation • Analysis • Validation • System integration	• Pre-production verification • Capital investments ▪ Tooling ▪ Capital equipment • Procurement • Final assembly	• Operational service and repair • Engine and system overhauls • Aircraft and part disposition • Leasing, acquisition financing • Inventory management
Jobs Supporting Phase			
• Engineering • Scientists • Finance and business analysis	• Engineering ▪ Software ▪ Design ▪ Stress ▪ Systems • Scientists • Finance	• Mechanics • Manufacturing engineering • Design engineering • Liaison engineering • Procurement • Quality • Sales	• Finance • Contract engineering ▪ Design ▪ Systems • Line and depot mechanics • Logicians • Business Analysts
Phase Duration			
• 2 or more years	• 2-5 years for original design • Updates to program after initial build	• 8-12 years per derivative with continuous innovation within models (e.g. 737 NG to 737 MAX)	• 20 or more years (lifetime of in service operation of an aircraft)
Intensity of Capital Investment			
• Low	• Medium	• High	• High

Sources of Positioning and Competitiveness

Assessment Components Importance

The relative importance of the six assessment components that influence manufacturing and aerospace competitiveness differs by the type of work being conducted and the associated requirements of that work.



Primary
- Primary contributors to ability to deliver aircraft or product/ component on time and to economic targets

Influential
- Factors that can reduce cost, but not core to aircraft or product / component delivery

Foundational
- Basic capability to be considered

Assessment Component Importance

Because requirements change by phase, the relative importance of assessment components shift over time.

	Program Lifecycle			
	Concept	**Design**	**Build**	**Service**
Workforce	Primary		Primary	
Education, Training, Social Institutions	Primary		Primary	
Supply Chain	Foundational		Primary	
Political Climate	Influential		Influential	
Economic Factors	Foundational		Influential	
Physical Infrastructure	Limited to no impact		Foundational	

Assessment Component Importance

Concept and Design

Program Lifecycle

Concept | **Design** | Build | Service

	Importance	General Program Lifecycle Phase Needs
Workforce	Primary	Highly skilled and educated workforces are required for aerospace concept and design development activities. This highly paid workforce often includes individuals with post-secondary and postgraduate educations in the sciences, engineering, and business.
Education, Training, Social Institutions	Primary	Producing highly skilled, innovative professionals that will develop the new products and technologies is required for the concept and design phase. The rapid aging of the existing workforce is increasing the pressure to produce or import new professionals at a high rate to replenish the retiring workers.
Supply Chain Network	Foundational	While the concept and design phases have a reduced reliance on the supply chain network as compared to the latter two phases, it is still imperative for aerospace companies to have ready access to materials, services, components, etc. Additionally, collaboration with the extended supply chain partners is integral to efficiently developing the technologies, materials, and production process of the future.
Political Climate	Influential	Public aerospace R&D funding for educational institutions and industry incentives for businesses reduce the financial impact and risk of developing new aerospace programs and facilities.
Economic Factors	Foundational	The physical footprint of testing facilities supporting concept and design is much smaller than for full production facilities requiring less investment if real property. The high wages paid during the concept and design phases reduce the impact of fringe benefits and insurance as a percentage of total loaded labor costs.
Physical Infrastructure	Limited to no impact	Physical infrastructure such as road, rail, etc. have a relatively low impact on the concept and design phase.

Assessment Component Importance

Build and Service

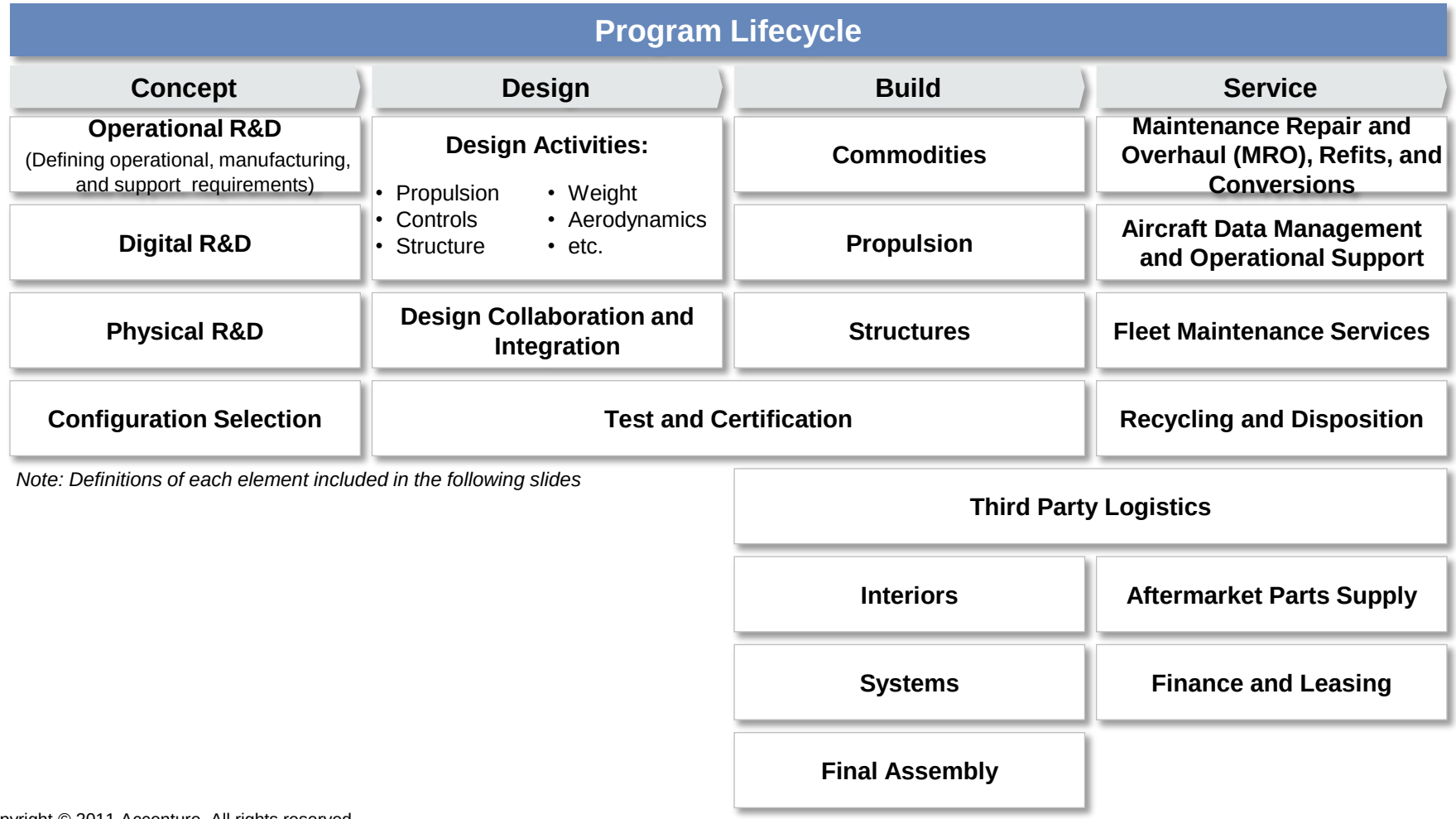
Program Lifecycle

Concept | Design | **Build** | **Service**

	Importance	General Program Lifecycle Phase Needs
Workforce	Primary	The productivity, learning curve, and wages of the manufacturing and service workforce drive the total landed cost of aerospace programs. A highly trained and certified workforce is required for complex manufacturing, service (operational or supply chain), and maintenance operations.
Education, Training, Social Institutions	Primary	A high output of quality workers from high school, technical schools, and apprenticeship type programs is vital to building aerospace manufacturing and service skills. Engineers will be critical for the build and support phase as innovation continues throughout the lifespan of a program . Increased production rates by major airplane manufacturers will put an increased demand on a qualified and skilled labor force.
Supply Chain Network	Primary	The strength and maturity of aerospace final assembly and/or component locations along with access to global sources of supply are keys to the success of manufacturing and physical aftermarket services. Remaining cost competitive, delivering quality, and meeting delivery schedules are top priorities for manufacturers and operators. Lean manufacturing techniques that control operating costs and inventory will be important in remaining competitive.
Political Climate	Influential	Taxes influence total landed cost, while incentive programs can support infrastructure and technology investments. As the intensity of capital investment is greater during the build and service phase, taxes and incentives have greater weight on development and expansion projects.
Economic Factors	Influential	The cost of aerospace is sensitive to non-recurring investments such as land, building, and machinery. Lower non-recurring costs can help overcome higher wage and fringe benefit costs (e.g. unemployment and workers compensation insurance).
Physical Infrastructure	Foundational	Robust road, rail, sea, and air systems are required to support major aircraft program production sites. The movement of large components for assembly or repair increases the need for infrastructure. Road, rail, and public transit work together to support the efficient flow of people, parts, and services to support the local aerospace community.

Program Lifecycle Elements

The program lifecycle phases are comprised of elements that make up the different areas of aerospace products and services.



Note: Definitions of each element included in the following slides

Program Lifecycle Elements Detail

Concept

Program Lifecycle			
Concept	Design	Build	Service

Definition

The concept phase of the program lifecycle is focused on understanding customer operational and support requirements for new or updated programs, developing any new technologies required to support those requirements, developing the necessary manufacturing and service infrastructure to support the program, and working with the launch customer to finalize its configuration.

Operational R&D (Defining operational, manufacturing, and support requirements)	Operational R&D defines a platform's operational performance requirements (range, fuel burn, load, passenger use, etc.) as well as the manufacturer's requirements to build and service the plane.
Digital R&D	Digital R&D encompasses digital design, modeling, and simulation activities that test new physical technologies in a virtual environment. It also includes software development which can govern flight controls, passenger systems, entertainment, etc.
Physical R&D	Physical R&D addresses physical design and testing of materials, structures, assemblies, systems, etc. required for a new platform.
Configuration Selection	Configuration selection is an activity wherein the airplane manufacturer works, often with customers, to define final platform configurations (seats, powerplant, payload, range, etc.) as well as conducting analyses to optimize the aircraft makeup for financial performance.

Program Lifecycle Elements Detail

Design

Program Lifecycle

Concept | **Design** | Build | Service

Definition

Design activities take the basic requirements and configuration defined in the concept phase and translate them through a series of steps into a group of flight test vehicles that serve to fully test manufacturing, its supporting supply chain, and an aircraft's operational performance. Design activities typically include an original equipment manufacturer and its key supplier partners.

Design Activities: • Propulsion • Controls • Structure • Mass • Aerodynamics • etc.	Design activities build upon the R&D activities of the concept phase and finalized configuration requirements to design, build, and test a new platform and its constituent components, assemblies, and systems. Design activities require significant collaboration between the aircraft manufacturer and its suppliers, particularly those of major sub-systems or structures, such as engines (propulsion), the auxiliary power unit, wing box, etc.
Design Collaboration and Integration	These activities encompass the ongoing physical and digital interaction between in-house and supplier design teams, culminating in "as-designed," "as built," and "as flown" bills of material for the initial fleet of flight test vehicles. Feedback from testing is then incorporated back into design to reconfigure designs and the supply chain to support full rate production.
Test and Certification	Test and certification is the culmination of the concept and design phases and entails a rigorous flight program of the aircraft test fleet, during which all elements of the plane are flown and tested under all conceivable conditions. Successful flight test culminates in certification by the respective governmental aviation agencies in which a platform will operate (e.g. FAA, EASA, military). Additional certification is completed at final assembly.

Program Lifecycle Elements Detail

Build

Program Lifecycle

Concept | Design | **Build** | Service

Definition

Build is the mature manufacturing phase of an aerospace program. During this time, the original equipment manufacturer and its extended supply chain scale from the low rate production period of flight test, initial program launch through full rate production, and delivery to customer. Build activities also provide parts to support manufacturing tooling and future maintenance and service needs.

Commodities and Fabrication	Commodities include fasteners, adhesives, wiring and other high-consumption parts and materials. Fabrication includes metal working, finishing, and similar activities.
Propulsion	Propulsion is focused on engines and their integration with fuel systems and powerplant systems that provide electricity to the rest of the platform. Aircraft customers can often choose which engine they want for their configuration.
Structures	Structures include significant supporting and formative portions of the plane such as wings (component stringers, etc.), nacelles, flight control surfaces, fuselage sections, etc.
Interiors	Interiors encompass the portion of the aircraft that passengers interact with: seats, lavatories, luggage bins, entertainment systems, etc.
Systems	Systems help “run” the platform and include various software packages, flight control, avionics, electrical, fuel, braking, etc.
Final Assembly	Final assembly is the set of activities that integrates commodities, propulsion, structures, interiors, systems, and structures into a platform, tests the final product, and delivers it.

Program Lifecycle Elements Detail

Service

Program Lifecycle

Concept | Design | Build | **Service**

Definition

Service is the set of activities required to keep an individual aircraft and an aircraft fleet flying on schedule, profitably for their designed life in service. Service activities may be offered by OEMs, suppliers, or purely-service focused businesses. Some airlines offer services through subsidiary MRO divisions.

Maintenance Repair and Overhaul (MRO), Refits, and Conversions	These activities are the traditional "break-fix" activities of line maintenance and regulation mandated checks. It also includes cabin and cargo refits and conversions that are often conducted when aircraft are sold from one operator to another on the secondary market.
Aircraft Data Management and Operational Support	These services range from using aircraft data to predict and schedule maintenance to optimizing crew scheduling, fleet recovery, navigation, and other operational services.
Fleet Maintenance Services	Many tier one suppliers, particularly engine manufacturers, and some OEMs provide ongoing maintenance support focused on maintaining fleet uptime, not break-fix.
Recycling and Disposition	Retired aircraft are often relegated to "boneyards" to be harvested for spare parts. Additionally hazardous material from retired platforms must be disposed of properly.
Third Party Logistics	Third party logistics providers package, kit, and deliver production items and spare parts and other items across the globe to assembly lines, airports, maintenance bases, etc.
Aftermarket Parts Supply	Aftermarket parts include spare parts for in-service platforms as well as "back catalogue" parts for older platforms. The latter may be made by firms that purchase IP from the original maker of the parts.
Finance and Leasing	Many commercial operators take advantage of different financing options such as secured lending, operating leasing (often referred to as a wet lease), leaseback, or finance leasing offered by often offered by financing companies of major OEMs.

Contents

Existing Aerospace in King County: Executive Summary

Themes

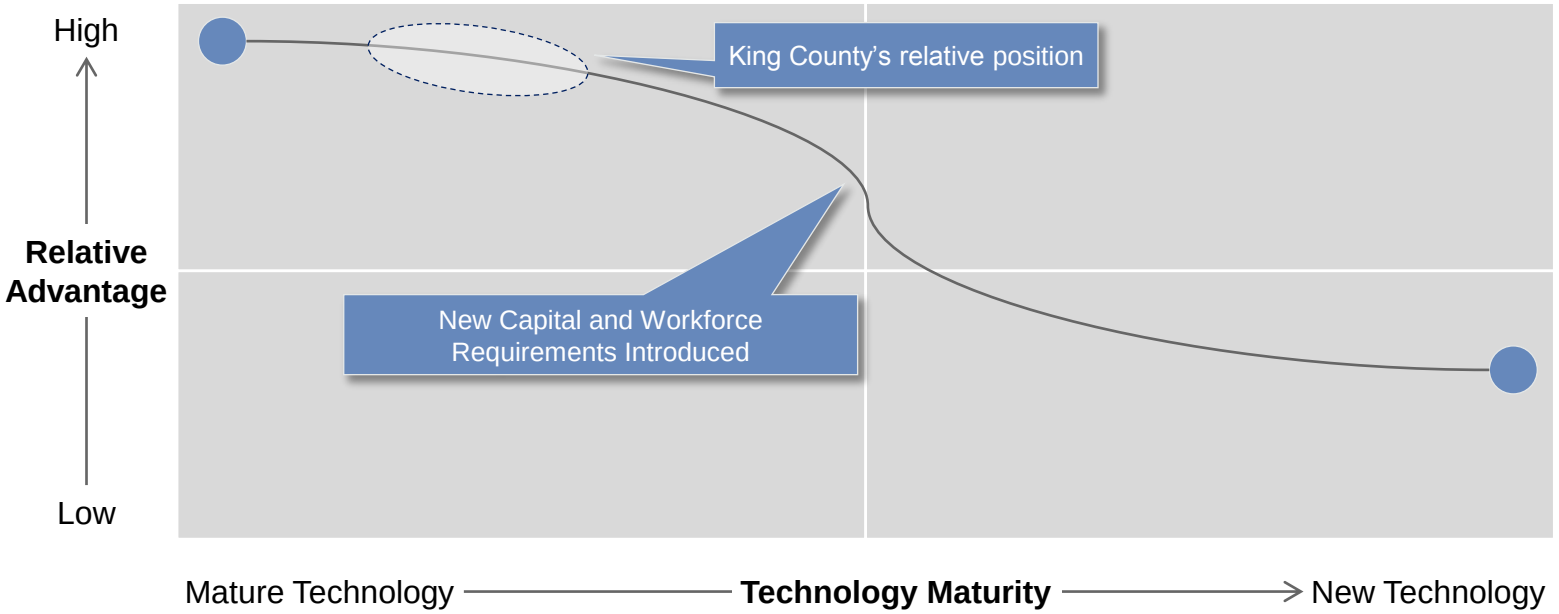
- Aerospace industry workers constitute a major portion of the workforces of King County and those of surrounding counties
- King County's ability to support increased production across Boeing programs and those of the other OEMs its suppliers support, will depend on replenishing and expanding the skills of the County's aerospace workforce
- Other regions of the country are actively pursuing coordinated economic and workforce development efforts to attract aerospace programs

Observations

- Aerospace generates significant sources of tax revenue for King County and its constituent local governments
- King County has established core competencies throughout the aerospace program lifecycle, with over half of Washington's aerospace firms located in the County
- King County possesses a robust supply chain network that serves the local and global aerospace industry, but continued investment freight mobility and public transportation is required to support planned growth in aerospace industry production and productivity

Emerging Challenges: Technology Transition

Established aerospace clusters lose relative advantages in cost and productivity with the advent of new technologies that reduce workforce learning curves and require new investments in plant and equipment.



	Mature Technology (e.g. Aluminum Aircraft)	New Technology (e.g. All Composite Aircraft)
Structure	Aluminum skin riveted to frame	Composite barrel or panels
Tooling	Existing tooling in place (jigs, etc.)	New tooling for forming, curing, and bonding
People	High productivity from decades of experience	Largely new skills for structures and final assembly
Suppliers	Large base of existing suppliers	Potential supplier changes and emphasis

New Airplane Programs

Potential Priorities for a New Program Requiring New Facilities

Our analysis of the 737 MAX indicates future siting decisions will share many of the same decision criteria based on their impact to Boeing's cost structure.

Criteria	Criterion	Relative Importance	Rationale
Disruption Potential	Workforce continuity and labor relations	Very High	One month of disruption could outweigh more than five years of potential labor savings
	Natural Disasters	Very High	One month of disruption could outweigh more than five years of potential labor savings
Recurring	Fully loaded labor costs	High	Ongoing benefit
	Low effective tax rate	High	B&O tax impacts companies during downward business cycles and may be paid two or more times on some purchases along the value chain
Non-Recurring	Leaseback of land and building at competitive rate	Medium	Mitigates the upfront costs of relocating
	Total environmental costs associated with facilities (e.g. paint hangars)	Medium-Low	Some sites are inherently disadvantaged due to the water table or pollution concerns
Transition	Semi and fully qualified mechanics	Medium	Would expect to recruit the batch of eager, numerate and semi-professionally trained mechanics locally
	Tax credits for on the job training	Medium	Tax credits for OTJ training programs (for labor loss)
	Education	Medium	Would want to attract and/or relocate qualified engineers
Certainties / No Surprises	Ability to cap or settle workmans' comp	Low	Provides visibility and control of costs
Business friendly local government	Ease of permitting	Low	Ability to receive timely government approvals could impact program schedule
Infrastructure	Access to efficient modes of transportation	Necessity but not a differentiator	Ground and air freight are dominant modes of transport for aerospace parts. Sea would be used for major overseas structures. Rail would not be greatly valued for a composite plane.

King County Aerospace at a Glance

Aerospace is an important industry to King County, accounting for 42,900 jobs, and supporting wages 10% higher than the County average

Number of Aerospace Jobs in King County	Aerospace Employment as a Percentage of Manufacturing in King County	Average aerospace salary in King County	Number of Aerospace Related Professions Expected to Grow 2008-2018
42,900	42%	$71,000	53

Sources: Washington Employment Security Department, Bureau of Labor Statistics, US Census Bureau, Accenture research

- There are **42,900 aerospace jobs** in King County, comprising **42 percent of the County's total manufacturing related employment and 4% of total employment**
- Washington's aerospace industry is highly concentrated in King County, with **48 percent of all aerospace jobs** in the State residing in the County
- Over **75,000 manufacturing and aerospace related jobs** exist in King County including machine shops, tooling companies, etc. that may not be exclusively aerospace focused, but serve the aerospace industry
- The average aerospace salary of $71,000 in King County **is estimated at 10% more** than the King County average of $64,120

Economic Impact of Aerospace

Aerospace is a significant job multiplier King County, with each direct aerospace job creating an estimated 43,000 additional jobs or 8% of county employment

Impact of the Aerospace Industry on King County Economy:

- Economic Output
- Jobs
- Labor Income
- Tax Revenue

Economic Output for Aerospace in King County	Total aerospace related jobs in King County	Total aerospace wages in King County	Economic Multiplier	Jobs Multiplier
$17.65B	42,900	$2.97B	1.8	1.99

- Aerospace businesses and aerospace labor force consume goods and services which have “ripple effects” through the economy through first, second, and third round purchases, generating economic activity between various industries
- Economic activity is measured using input-output models to show “multiplier effects”, or the ratio of an industrial sector’s total economic impact to its direct economic impact
- Aerospace businesses and aerospace labor force consume goods and services which have “ripple effects” through the economy through first, second, and third round purchases, generating economic activity between various industries
- Economic activity is measured using input-output models to show “multiplier effects”, or the ratio of an industrial sector’s total economic impact to its direct economic impact
- **Aerospace has a 1.99 jobs multiplier**, implying that one aerospace job creates indirectly creates nearly one additional job in the county. Thus, the estimated total impact of the aerospace industry **results in 85,581 jobs in King County** or **8% of total county employment.**

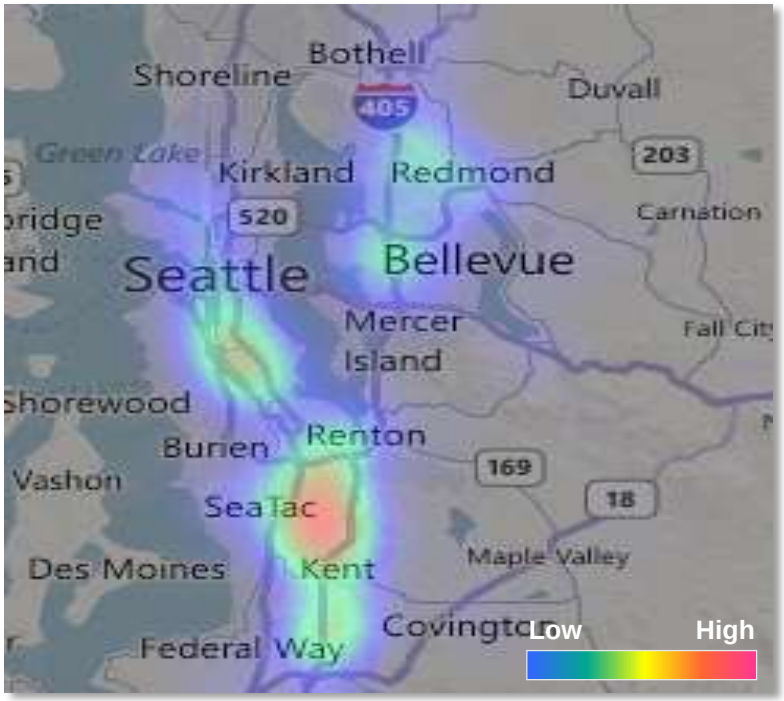
Sources:
Technology Alliance, “Alliance The Economic Impact of Technology-Based Industries in Washington State”, 2010
Washington State Office of Financial Management
Accenture research

King County - Aerospace Company Footprint

Top 10 Largest Aerospace Companies by Headcount in King County	
Aero Controls Inc.	Exotic Metals Forming Company
Aim Aerospace Inc.	General Dynamics
AVTECH Corporation	Honeywell Electronics & Avionics Systems
Boeing Commercial Airplanes	IDD Aerospace Corporation
Compass Aerospace Northwest	Primus International

Source: Decision Data Resources
Note: 2010 Data, Companies listed alphabetically

Heat Map of Current Aerospace Clusters

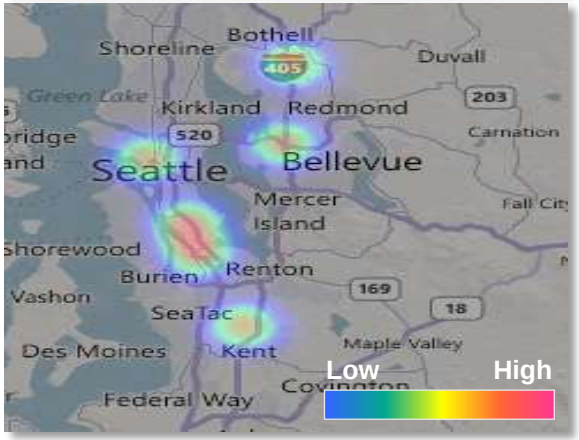


Data Source: Washington State Dept. of Commerce, Aerospace Futures Alliance, and Decision Data Resources
Heat Maps: Number of aerospace companies built using Bing interactive maps

- Out of the estimated **700 aerospace related firms in Washington**, over **400 are located within King County**
- GPS coordinates of all known aerospace companies in King County were used to develop a composite geographic heat map with high density areas are shown in red and orange
- The heat map identifies three distinctive aerospace clusters exist in Bellevue/Redmond, Renton/Kent, and Seattle

Aerospace Footprint by Program Lifecycle Phase

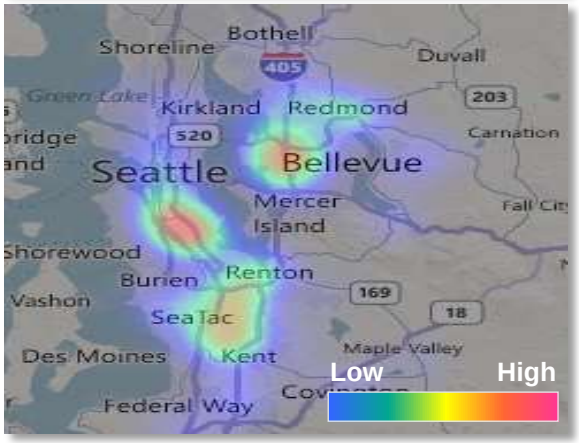
Concept



Design

Build

Service



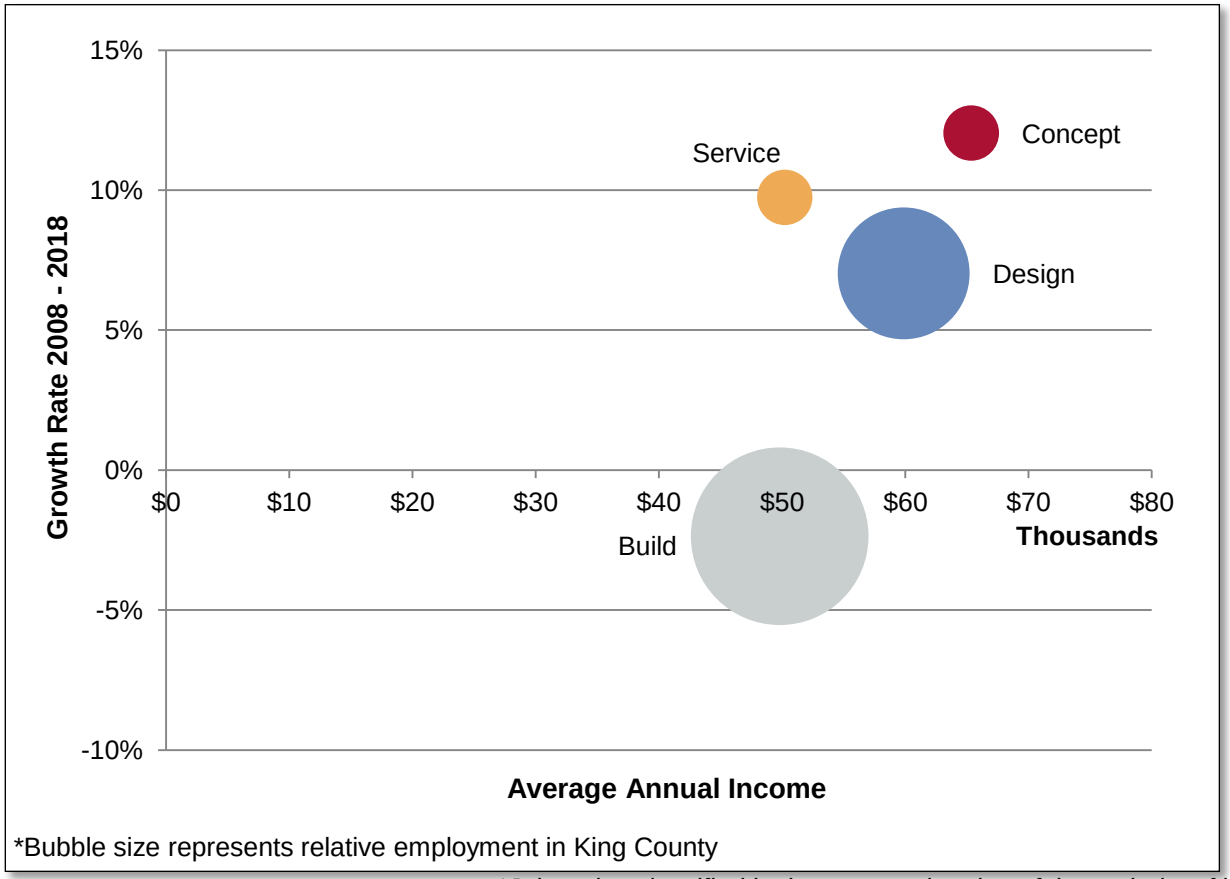
*Companies classified by best approximation of the predominance of their business, companies may serve multiple phases of the lifecycle

Aerospace Employment by Program Lifecycle Phase

Total Employment Headcount by Phase

King County's legacy workforce has been focused on final assembly activities establishing large advantages offering both high productivity and quality.

Program Lifecycle Employment



*Bubble size represents relative employment in King County

Job Classification Process

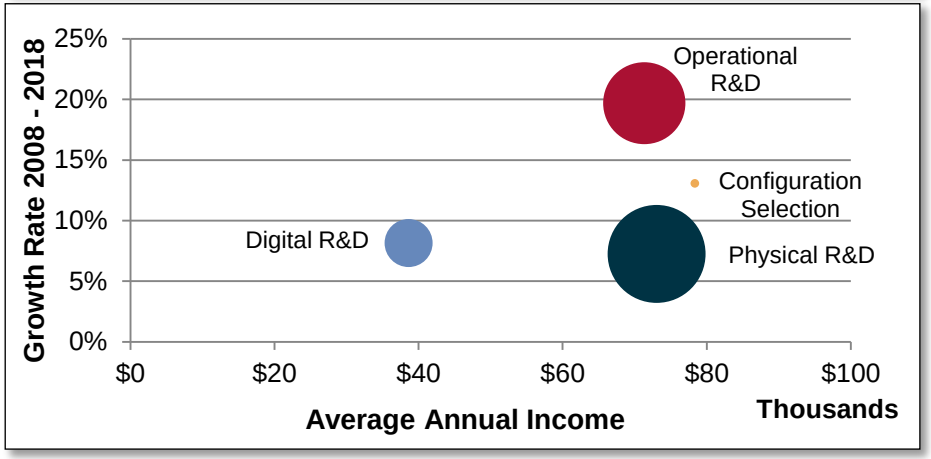
- Standard Occupational Classification (SOC) codes aligned to the aerospace industry were assigned to the different lifecycle phases of an aircraft program
- The employee headcount in King County associated with the SOC codes were aggregated to establish the relative bubble size for each of the four lifecycle phases
- All employees under an SOC code were aligned to a single phase, no codes headcounts were divided between phases
- The following slide aligns the different SOC codes to specific element areas within each lifecycle phase

*Job codes classified by best approximation of the majority of its work, job codes may serve multiple phases of the lifecycle

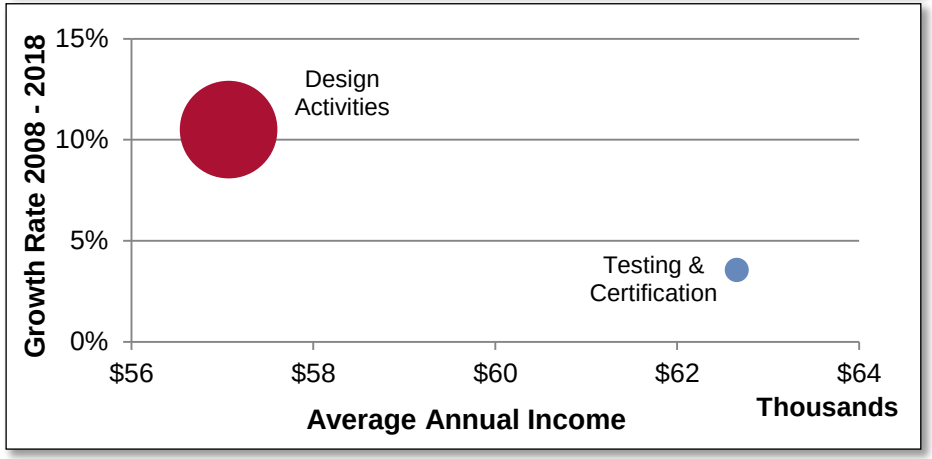
Aerospace Employment by Program Lifecycle Phase

Headcount by Element by SOC Job Code

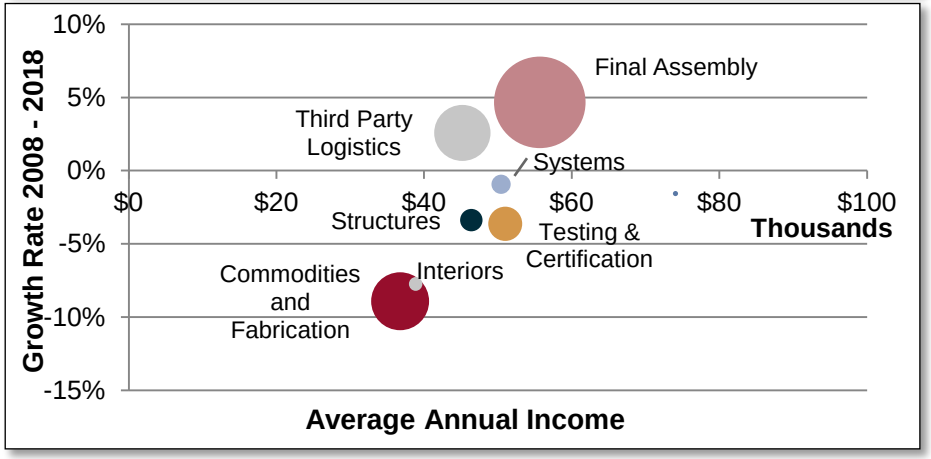
Concept



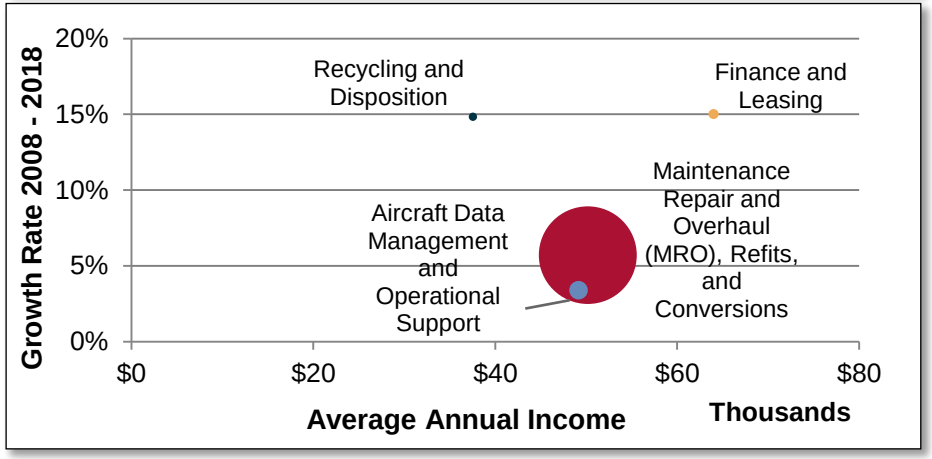
Design



Build



Support



*Job codes classified by best approximation of the majority of its work, job codes may serve multiple phases of the lifecycle
**Bubble size represents relative employment in King County

Industry Movers

Industries that Have Experienced the Highest and Lowest Growth from 2006-2011

Five Year Growth Industries

Industry	2006 Employ.	2011 Employ.	Percent Change
Computer Systems Design and Related	20,700	29,300	42%
Hospitals	23,700	28,600	21%
Educational Services	20,700	24,900	20%
Educational and Health Services	126,100	145,400	15%
Professional, Scientific, and Tech. Services	89,800	103,000	15%

Source: Washington Employment Security Department, Monthly Employment Report

Five Year Decline Industries

Industry	2006 Employ.	2011 Employ.	Percent Change
Natural Resources and Mining	700	400	-43%
Credit Intermediation and Related	25,300	15,700	-38%
Construction of Buildings	20,200	12,600	-38%
Wired Telecommunications Carriers	4,900	3,200	-35%
Heavy and Civil Engineering Construction	7,600	5,200	-32%

Source: Washington Employment Security Department, Monthly Employment Report

Aerospace Job Growth in the Puget Sound

Jobs with the Highest and Lowest Expected Growth from 2010-2018

Growth Jobs in Aerospace

Job Title	2010 Employ.	2018 Employ.	Percent Change
Computer Software Engineers, Applications	683	915	34%
Environmental Engineers	65	85	31%
Computer Software Engineers, Systems Software	1088	1419	30%
Market Research Analysts	319	409	28%
Environmental Scientists and Specialists, Including Health	2	3	28%
Civil Engineers	7	9	24%
Computer and Information Scientists, Research	105	130	24%
Operations Research Analysts	237	289	22%
Logisticians	1229	1469	21%
Commercial Pilots	113	134	20%

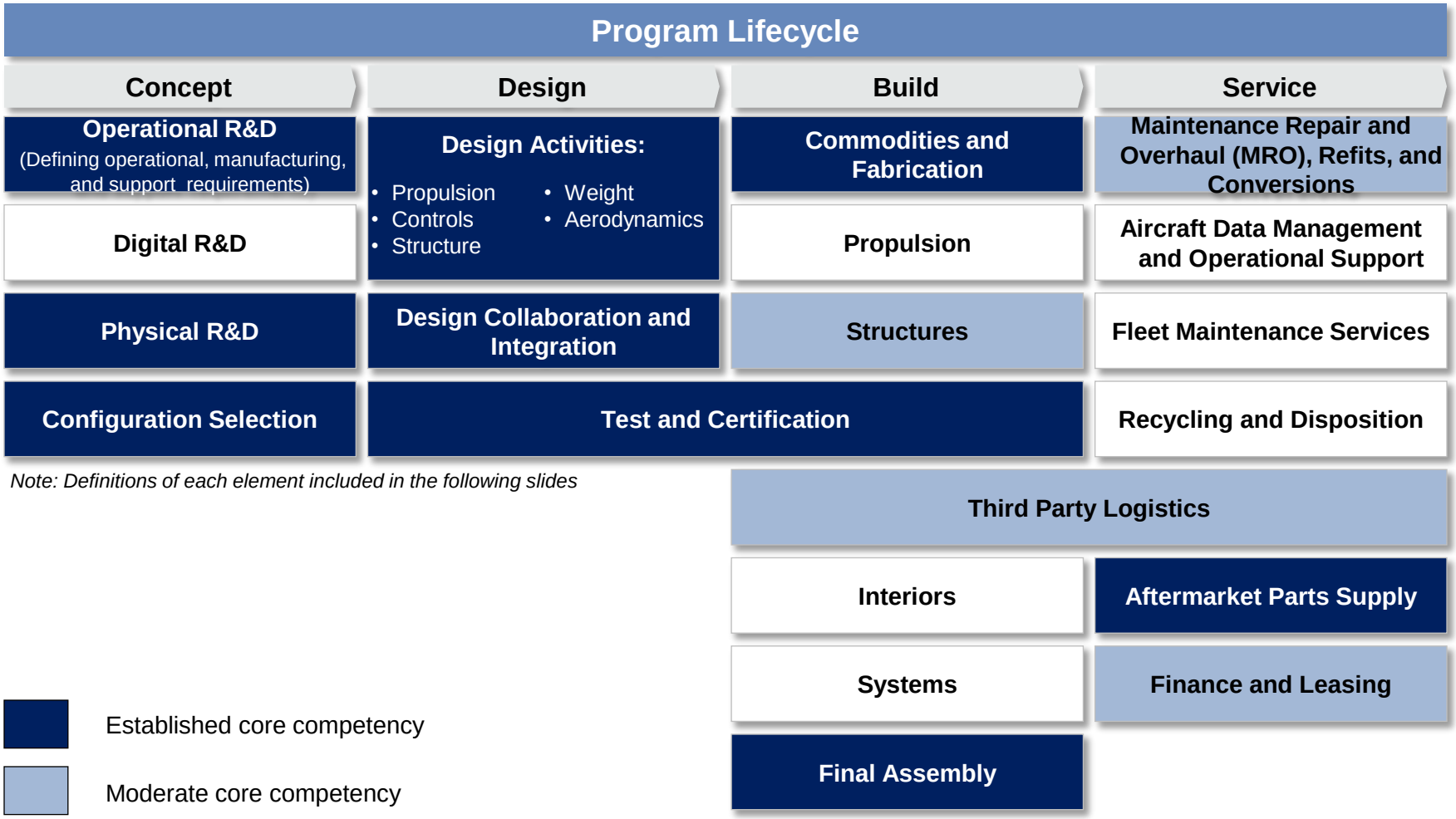
Source: US Bureau of Labor Statistics, Employment Projections Program

Jobs in Decline in Aerospace

Job Title	2010 Employ.	2018 Employ.	Percent Change
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	83	61	-27%
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	115	84	-27%
Photographic Processing Machine Operators	4	3	-24%
Machine Feeders and Offbearers	1	1	-22%
Computer Operators	23	19	-19%
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	76	64	-16%
Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	164	138	-16%
Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	29	24	-16%
Numerical Tool and Process Control Programmers	169	143	-15%
Electrical and Electronic Equipment Assemblers	75	64	-15%

Source: US Bureau of Labor Statistics, Employment Projections Program

Existing Aerospace Core Competencies in King County



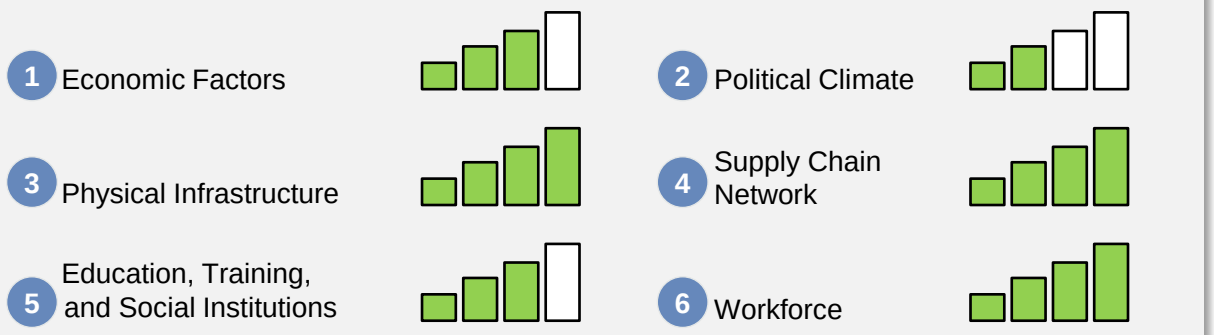
Note: Definitions of each element included in the following slides

King County Profile

Competitiveness Overview:

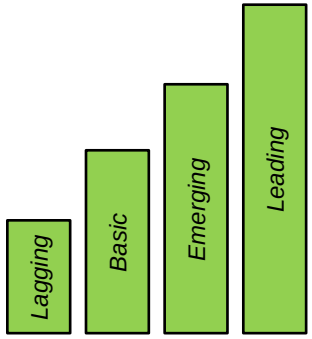
- Areas of the County have demonstrated strong educational performance and workforce development, however, structural, quality, and quantity improvements are needed for the region to retain its workforce advantages including effectively developing a diverse demography
- Existing aerospace workforce provides quality and productivity advantages in the industry but must continue to invest to develop competencies in developing technologies
- Effective collaboration across local governments is needed to increase the overall competitiveness of the state while reducing the County's cost profile

Assessment Elements:



Qualitative capabilities are rated on a four step scale:

1. *Lagging:* large gaps to industry requirements require significant investment or structural changes to close gaps
2. *Basic:* foundation in place for area assessed, but material gaps may exist to industry requirements
3. *Emerging:* pockets of maturity or innovation in area assessed with consistent performance to industry requirements
4. *Leading:* highly mature or innovative in area, clear distinction from other states in meeting or exceeding industry requirements



Key County Facts

- Population: 1,933,400
- Labor force: 1,112,640
- Unemployment: 8.1% (9.0% WA, 9.6% US)
- Est. median income: $65,383
- % of workers that reside in county: 85%+

Additional Comments

- 737 assembly and multi –program engineering knowledge base
- 737 supply chain network optimized for Renton; wing and interior component parts fabrication optimized for Kent and Auburn operations
- Workforce competes on productivity and quality, not through low cost offerings
- The County has supported the establishment of Technology Access Foundation (TAF) academies through funding and lease of land
- The permitting processes across local, state, and federal entities has been identified as a complex hurdle for business regarding expansion and future development

King County Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis Summary

King County Strengths

- Culture of innovation in place for both product development and process improvement at both in aircraft final assembly and in the supporting supply chain product and service network
- Foundational educational and training programs are in place and have the recognition of public and private sources of funding
- King County has over half of Washington's approximately 750 aerospace companies, covering all phases of the aerospace program lifecycle
- King County possesses organized and active county and municipal economic development agencies
- King County is already a significant distribution hub

King County Opportunities

- Work with industry to define critical "pathways" to certified levels of aerospace employment across the production, engineering, and support/service workforces
- Work with industry and the state to identify and act upon opportunities to support experiential learning and certification opportunities
- Develop an integrated economic development strategy that builds on the aerospace strengths and cost advantages of other parts of the state to support King County's core strengths
- Develop and implement an integrated infrastructure approach that supports freight and personal mobility in King County
- Advocate at the state and federal level to streamline permitting

King County Weaknesses

- A significant portion of the King County aerospace workforce will reach retirement age within the next five years
- Cross-industry engagement in workforce development programs, while increasing, still lags leading models in other regions
- Investments in new supply chain network capital (plant, property, equipment) are relatively more expensive and time consuming in King County than elsewhere in Washington and globally
- Presently, only basic coordination across counties to support shared goals in aerospace and other economic development
- Roads and transit supporting aerospace require investment to support existing and increased volume of workers and material
- Work stoppage remains a uncertainty in the long term

King County Threats

- King County's productivity advantage may shrink due to the inability to replenish and grow skills in the face of competing regions' workforce investments
- The lack of commonly defined pathways into the aerospace workforce affects the ability to design programs that meet industry needs and attract workers into all areas of the industry
- The viability of the supply chain network is directly tied to the talent that can continue to generate productivity growth
- Other regions have can offer direct monetary incentives
- Lack of investment in roads and public transit could deter both expansion and new investment

King County SWOT Analysis
Workforce

King County Strengths

- Existing aerospace workforce provides:
  - Global leaders in systems engineering
  - Skilled workforce will continue to maximize the 737 production and final assembly learning curves in Renton, Auburn, and Fredrickson
  - High level of collaboration between engineering and skilled workforce
- Culture of innovation in place for both product development and process improvement at both in aircraft final assembly and in the supporting supply chain product and service network
- The total size of the regional population is sufficient to meet future headcount quantity requirements

King County Opportunities

- Work with industry to define critical "pathways" to certified levels of aerospace employment across the all workforces
- Work with industry and the state to identify and act upon opportunities to support broader funding and enrollment of experiential learning opportunities, particularly apprenticeship programs such as AJAC, high school programs such as Launch Year, and training programs such as WATR or the siting of a training center at Renton Airport
- Work with industry, educational institutions, community and technical colleges, and workforce development agencies to increase aerospace career awareness, particularly in military, K-12, and new resident, particularly first generation, populations

King County Weaknesses

- A significant portion of the King County aerospace workforce, particularly the Boeing workforce, is nearing retirement
- While the overall population of King County is large enough to compensate for retirements and meet expected hiring increases in aerospace, it may not possess the depth and quality of skills that the industry will require to meet current and future needs
- King County's labor rates are higher than other counties and states, which requires King County to compete based on total cost, inclusive of productivity and efficiency
- Suppliers remain the primary source of talent for Boeing hiring, placing greater pressure on sustainability of the overall workforce
- Work stoppage remains a uncertainty in the long term

King County Threats

- King County's productivity advantage may shrink due to the inability to replenish and grow skills in the face of competing regions' workforce investments
- Lack of shared goals between industry, the County, the state, and supporting institutions would weaken workforce investments
- Agreements to produce the 737 MAX in King County may not extend to future programs, giving incentive to lower-cost regions to continuing vying for this work against King County
- Other regions' development of new technologies and trained workers could dilute King County's productivity advantages, particularly in less capital-intensive areas such as software

King County SWOT Analysis

Education, Training, Social Institutions

King County Strengths

- Community and technical colleges within and around King County have established aerospace curricula and have demonstrated the ability to secure external funding (e.g. Air Washington)
- State universities produce high quality, though a constrained quantity, engineering graduates and demonstrate the need for greater investment in cross-industry engineering talent
- Foundational aerospace training and apprenticeship programs are in place and have the recognition of public and private sources of funding
- At its highest echelon, the K-12 system produces nationally-leading skills in its students

King County Opportunities

- Work with aerospace and non-aerospace industry leaders (e.g. software) alike to define critical "pathways" to certified levels of employment across the production, engineering, and support/service workforces and the skills and outcomes the P-20 system should deliver to support them (e.g. STEM, etc.)
- Work with industry and the state to identify and act upon opportunities to support experiential learning and certification opportunities, particularly apprenticeship programs such as AJAC, high school programs such as Launch Year, and training programs such as WATR
- Work with the state to support increased funding of more university-level engineering slots and industry-relevant research

King County Weaknesses

- University engineering programs are not yet capable of producing the number of graduates and industry-relevant research at the scale needed by the aerospace and other high tech industries
- Work remains to align community and technical college aerospace training programs with industry requirements, target populations, and allocation of funding
- Cross-industry engagement in workforce development programs, while increasing, still lags some of the leading models visible in other regions of the U.S.
- While King County K-12 schools produce stand out graduates, there remain gaps, particularly in STEM proficiency, for students entering the university and community and technical college systems that slow student progress and increase school costs

King County Threats

- The lack of commonly defined pathways into the aerospace workforce affects the ability to design programs that meet industry needs and attract workers into all areas of the industry
- Washington's past success in importing engineers is not guaranteed to continue; companies may move closer to talent
- Inability to develop the number of quality manufacturing workers to provide for both the growing demand and replace the retiring workforce will diminish the region's competitive advantage
- Failure to efficiently adapt curriculum at community/ technical colleges and other training institutions will not enable the region to maintains its workforce advantage as technology changes
- Lack of adequate funding across the entire education spectrum has created a competitive environment that does not foster collaboration

King County SWOT Analysis

Supply Chain Network

King County Strengths

- King County has over half of the approximately 750 aerospace companies within the State of Washington, covering all phases of the aerospace program lifecycle
- Aerospace manufacturing companies, such as Boeing, have large existing capital investments in King County that are costly to move to other locations in the absence of significant changes in technology or production techniques
- King County suppliers support Boeing's final airplane assembly plants with parts and services through just in time (JIT) delivery, lean manufacturing, and on-site collaboration

King County Opportunities

- Work through enterpriseSeattle to coordinate with industry, the state, and other counties to develop an integrated economic development strategy that identifies how King County can employ the aerospace strengths and cost advantages of other parts of the state to support its own core strengths
- Work with the state and industry to support investment in new technologies (e.g. materials, propulsion, etc.) and efficient manufacturing techniques that can increase the value added by the local supply chain while retaining King County's productivity advantages in new and emerging aerospace technologies
- Work with the state to prioritize investments in physical infrastructure that support the supply chain network

King County Weaknesses

- Investments in new supply chain network capital (plant, property, equipment) are relatively more expensive and time consuming in King County than elsewhere in Washington and globally
- The network of suppliers within King County has historically played a distant second to Boeing in considerations of supporting the aerospace industry
- The "institutional memory" and productive efficiency associated with the existing supply chain network may be at risk with the predicted rise in retirements
- Concentration of all final assembly operations within a single locations could be viewed as a risk to disruption (e.g. supply chain disruption, work stoppage, natural disaster etc.)
- Lack of undeveloped land parcels for large scale mfg sites

King County Threats

- The viability of the supply chain network is directly tied to its ability to retain and grow talent that can continue to generate productivity growth
- The attraction of outsourcing the design and manufacturing of aerospace components and assemblies to low cost regions remains despite recent demonstrated challenges with the model
- New production techniques, aerospace designs, and material technologies that are developed and deployed outside of Washington will quickly detract from the existing strengths of the Washington supply chain network

King County SWOT Analysis

Political and Economic Factors

King County Strengths

- King County possesses organized and active county and municipal economic development agencies, led by enterpriseSeattle which is emerging into a coordinating role for aerospace activity in the county
- Municipal governments in King County have put a premium on demonstrating a commitment to supporting private investment by collaborating across topics such as permitting, flood control, and other areas
- State and local tax incentives for aerospace have provided support to the industry in King County

King County Opportunities

- Advocate at the state and federal level to work toward streamlining the permitting and environmental approval processes across the county while preserving the environmental and other protections valued by the county's residents
- Work through enterpriseSeattle and the county executive to improve cross-county coordination on issues of shared interest
- Work with the state and municipalities to Identify and implement aerospace-specific tax incentives and policy to attract new investment
- Continue to support key projects such as the cleanup of the Duwamish basin and flood mitigation along the Green River that in the long run can reduce the cost and risk of investment

King County Weaknesses

- Coordination across state regions to support shared goals in aerospace and other economic development can be strengthened
- King County and its municipalities are simplifying permitting, but the mix of state, local, and federal approvals remains complex
- Labor cost "loads," such as health care, remain a focus for businesses in the County
- The Washington constitution limits the ability of state, county, and municipal officials to offer significant direct monetary incentives
- Perception of Green River flood risk deters some investment
- Current tax structure is a disincentive to some maintenance and overhaul activities, particularly for general and business aviation

King County Threats

- Other state and national governments have significant flexibility in offering direct monetary incentives for manufacturers and supporting companies – e.g. suppliers, logistics providers, etc.
- The marketing, if not actuality, of more rapid permitting and regulatory approval in other states could prove a significant enticement to companies seeking to move or open a new facility
- Continued perception of higher cost to invest in King County related to flood insurance, environmental mitigation, etc. may lead companies to invest outside of King County or the state

King County SWOT Analysis

Physical Infrastructure

King County Strengths

- Three airports capable of supporting manufacturing operations, MRO, and flight training to varying degrees
  - SEA TAC is a central hub in Boeing's spare parts network
- A significant distribution hub is in place, supporting both the flow of goods across many industries and offering the potential of shifting a portion of warehouse capacity to higher value light manufacturing or configuration activities
- Ready access to existing oversize/double stack rail transit line running in the Green River valley
- Deep water ports at Seattle and Tacoma provide ready access to inbound production material and have additional capacity

King County Opportunities

- Develop and implement an integrated infrastructure approach that supports freight and personal mobility in King County
  - Improve I-405, SR-167, and SR-509 to improve flow of freight and people facilities that support aerospace
  - Improve public transportation to support manufacturing workforce in the areas where Boeing and other aerospace company employees live and work, e.g. F-Line in Renton, greater RideShare capacity, additional SoundTransit capacity or new schedule times, etc.
  - Identify opportunities for transit integration across King, Pierce, and Snohomish County lines
- Support navigational improvements at Renton Municipal to support volume of new production at Boeing Renton

King County Weaknesses

- A coordinated network of public transportation for manufacturing workers, particularly those who live and work in different counties, is not fully in place
- Roads supporting aerospace facilities require investment to support existing and increased volume of workers and material (e.g. I-405, SR-167, SR-509)
- The runway length and approach paths at Renton Municipal Airport limits the size and volume of aircraft able to use the field
- The single freight rail line into Boeing Renton could be viewed as a potential chokepoint

King County Threats

- Lack of investment in roads and public transit could deter expansion of existing companies or recruitment of new companies due to impact to inventories and cost to employees
- Current road infrastructure is satisfactory for supporting volumes out of the Port of Seattle but improvements may be required if those volumes increase to fully capacity (30% capacity is available)
- Additional large scale MRO business is likely to locate elsewhere due to cost, non-hub location for most airlines, and capacity
- While King County has put forth positive effort to be prepared for emergencies, existing infrastructure in King County is vulnerable to natural disasters such as earthquakes and flooding

Key City Observations

Assessment Criteria Observations	
Auburn	• Existing part fabrication facility supporting programs in both Renton and Everett • Large contingent of shipping and logistics companies; all three major railroads converge within the city limits and approximately 7 million square feet of warehouse distribution (top three in the nation)
Bellevue	• Established K-12 system consistently scoring among the highest within King County and the State of Washington • Large population employed in software engineering positions
Federal Way	• Aerospace employment located in the city is predominantly office support activities enabling manufacturing operations in the valley • Commuter municipality with approximately 50% of the labor force traveling to another city for work
Kent	• Insurance premiums for businesses within the floodplains have not returned to the levels previously experienced prior to the Howard Hanson Dam repairs which significantly reduced flood risk • Existing 737 wing parts/ components manufacturing facility
Renton	• Existing 737 manufacturing operations consisting of three lines, two of which have an ultimate capacity of 42 airplanes per month • Renton facility is hiring at a pace of ~150 per week for skilled labor, receiving 100-200 applications weekly
Seattle	• Seattle is developing a growth strategy that targets key manufacturing industries, clean tech, life science global heath, and a downtown core which includes retail, professional services and finance institutions • Have significant reform initiatives ongoing looking to address areas such as permitting, utilities, etc.
Tukwila	• Making significant changes in the permitting process regarding environmental regulations and business development, working to make the process more predictable from a cost and time perspective • Due to the convergence of I-5, I-405, and I-509, transportation to and from the city is well served

Contents

King County Opportunities in Aerospace: Executive Summary

Themes

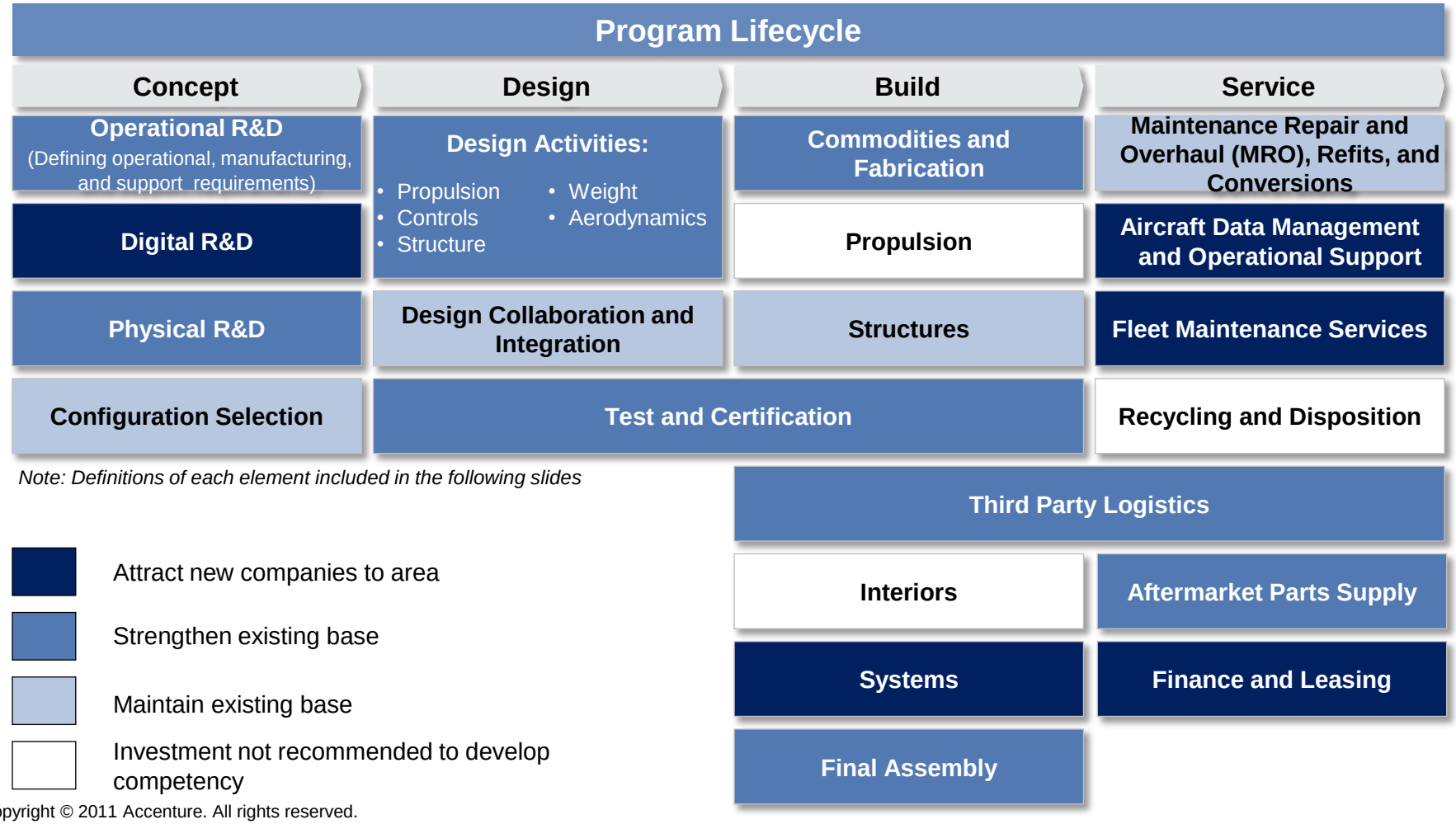
- As aerospace products become more complex, there is an increasingly tighter correlation between where new technologies and products are developed and where they are assembled; production outsourcing will still occur, but the highest value-added activities will align with development teams
- Aftermarket services such as aircraft data management and fleet availability service models are significant growth opportunities for the industry and for companies within King County
- King County's location is well-located to support movement of aerospace products and services to high growth markets in Asia

Observations

- Because King County competes on quality and productivity, not lowest cost, it must focus on developing first mover advantages in developing and scaling new processes and technologies
- King County is a world leader in high technology and software as well as aerospace, however there have yet to arise firms that combine the skills and experiences of these workforces to address business opportunities related to the emergence of "digital airlines" that use aircraft data to improve their operational efficiency

Opportunities for King County

King County should strategically invest in areas of the supply chain to maintain or establish core competencies in the Puget Sound.



Note: Definitions of each element included in the following slides

Opportunities for King County

Concept Details

Program Lifecycle

Concept | Design | Build | Service

	Investment Recommendation	Rationale
Operational R&D (Defining operational, manufacturing, and support requirements)	Strengthen existing base	Cost savings for airlines will come not only from how an airplane is built but how operators use the aircraft
Digital R&D	Attract new companies to area	Large growth expected in software industry related to solutions operating and monitoring aircraft; existing workforce of skilled software engineers in both aerospace and non-aerospace capacities
Physical R&D	Strengthen existing base	King County's competitiveness is based on productivity and quality. Maintaining its advantage depends upon innovating first.
Configuration Selection	Maintain existing base	This is a small group of experts that is already established in King County

Opportunities for King County

Design Details

Program Lifecycle

Concept | **Design** | Build | Service

	Investment Recommendation	Rationale
Design Activities: • Propulsion • Controls • Structure • Mass • Aerodynamics	Strengthen existing base	Location of final assembly facilities for aircraft built on “new technology” will most likely be co-located with experienced engineers that designed the “new technology”. Design engineering is a high wage job that significantly contributes to the overall economy.
Design Collaboration and Integration	Maintain existing base	This is the major competitive advantage for OEMs and tier one suppliers. This will increase in importance as the supply chain continues to globalize and software plays an increasing role in the design, production, and operation of an aircraft.
Test and Certification	Strengthen existing base	Location of final assembly facilities will most likely be collocated with experienced engineers that provide test certification of aircrafts and airplane technologies. Test engineering is a high wage job that significantly contributes to the overall economy.

Opportunities for King County

Build Details

Program Lifecycle

Concept | Design | **Build** | Service

	Investment Recommendation	Rationale
Commodities and Fabrication	Strengthen existing base	Precision manufacturing processes with current materials will evolve to include new technologies and materials. By establishing a leading position in these new areas, King County can secure jobs that support future aerospace programs.
Propulsion	Investment not recommended to develop competency	Major production operations require significant investment and workforce expertise not currently located in the region. Engine manufacturers have not indicated a need to collocate with aircraft final assembly locations.
Structures	Maintain existing base	King County's productivity in final assembly is closely aligned with its ongoing expertise in airplane structures.
Interiors	Investment not recommended to develop competency	Expertise located in the region, however, not within King County. Current locations sufficiently supply final assembly operations in the County.
Systems	Attract new companies to area	Systems companies are playing an increasingly important role as airplanes become more sophisticated. They are also playing a more important role in helping airlines meet operational targets. Systems are a high margin and stable business .
Final Assembly	Strengthen existing base	Increasing productivity and quality of final assembly activities support the growth of final assembly workforce in King County. The presence of a final assembly site also encourages other parts of the value chain to co-locate nearby.

Opportunities for King County

Service Details

Program Lifecycle

Concept | Design | Build | **Service**

	Investment Recommendation	Rationale
Maintenance Repair and Overhaul (MRO), Refits, and Conversions	Maintain existing base	King County's physical location does not make it an optimal MRO location for airlines not based out of Sea-Tac. Continue support of MRO for Alaska and Delta's international operations along with other small maintenance requirements
Aircraft Data Management and Operational Support	Attract new companies to area	The rise of the "digital airline" makes data management a highly lucrative new business opportunity. Boeing is a pioneer in this area but has yet to capitalize. Local technology firms may bring key data management skills to this area.
Fleet Maintenance Services	Attract new companies to area	As the maintenance market moves from a transactional based maintenance model to availability based pricing models, companies in King County will have the opportunity to provide high margin services at low capital investment.
Recycling and Disposition	Investment not recommended to develop competency	Due to the climate conditions, the Pacific Northwest is not an optimal place for retired aircraft storage. Strict environmental regulations inhibit hazardous metal disposition.
Third Party Logistics	Strengthen existing base	Geographically location provides ability to serve Asian markets in addition to serving major Midwest and Eastern markets in the US. Physical infrastructure in place to handle large throughput of cargo via ocean, air, and land routes.
Aftermarket Parts Supply	Strengthen existing base	Aftermarket parts supply is a high margin business experiencing large growth rates. Geographic location to source of engineering and proximity to Asia makes King County a good location to serve Boeing's highest growth market.
Finance and Leasing	Attract new companies to area	Aircraft financing and leasing are high revenue businesses with large transactions. Existing knowledge base in King County capable supporting successful financing and leasing businesses within aerospace.

Contents

King County K-12 Education Results

Measurement of Student Progress (MSP)/ High School Proficiency Exams (HSPE) Results

Grade Level Reading	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
3rd Grade	83.60%	83.90%	72.40%	67.10%	71.90%	78.60%	73.10%
4th Grade	74.10%	75.60%	64.40%	64.20%	68.30%	72.00%	67.30%
5th Grade	78.70%	78.60%	69.00%	65.90%	63.90%	70.90%	67.70%
6th Grade	68.30%	80.40%	66.80%	72.30%	67.90%	76.60%	70.60%
7th Grade	49.00%	71.30%	56.50%	54.90%	57.20%	62.60%	56.50%
8th Grade	63.70%	80.90%	69.90%	65.30%	69.20%	72.80%	68.70%
10th Grade	78.60%	90.30%	80.90%	83.40%	75.50%	80.30%	82.60%

Grade Level Writing	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
4th Grade	57.80%	80.70%	53.60%	59.70%	61.50%	67.90%	61.40%
7th Grade	58.20%	86.20%	71.70%	68.00%	69.80%	75.70%	71.00%
10th Grade	85.80%	92.80%	83.20%	87.50%	81.50%	85.00%	86.30%

Grade Level Science	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
5th Grade	56.10%	71.40%	42.70%	44.30%	51.00%	63.70%	55.70%
8th Grade	52.00%	80.00%	55.30%	59.20%	64.30%	69.70%	61.60%
10th Grade	39.90%	71.20%	41.10%	49.80%	39.00%	52.70%	49.90%

Source: Washington State Report Card – Office of Superintendent of Public Instruction

King County K-12 Education Results Cont.

Measurement of Student Progress (MSP)/ High School Proficiency Exams (HSPE) Results

Grade Level Math	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
3rd Grade	72.00%	79.20%	63.10%	56.80%	62.60%	67.10%	61.60%
4th Grade	69.50%	72.80%	58.70%	57.20%	58.20%	64.60%	59.30%
5th Grade	69.00%	79.90%	67.30%	59.80%	56.20%	65.20%	61.30%
6th Grade	60.90%	75.30%	55.20%	66.30%	49.90%	65.80%	58.80%
7th Grade	50.10%	78.00%	49.20%	56.80%	48.40%	65.60%	57.00%
8th Grade	44.50%	72.90%	48.40%	51.40%	50.90%	61.60%	50.40%
10th Grade[1]	39.00%	68.00%	41.00%	48.00%	35.00%	42.00%	18.00%

EOC[2] Math Scores	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Algebra - EOC Year 1[1]	60.00%	80.00%	45.00%	62.00%	60.00%	63.00%	64.00%
Geometry - EOC Year 2[1]	69.00%	85.00%	63.00%	71.00%	70.00%	63.00%	64.00%

1. Result recorded off of a graph and therefore approximated, discrete results not available
2. EOC – end of class

Source: Washington State Report Card – Office of Superintendent of Public Instruction

King County K-12 Education Results Cont.

Measurement of Student Progress (MSP)/ High School Proficiency Exams (HSPE) Results

Graduation Rates	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Annual Dropout Rate (2009-10)	3.30%	0.60%	3.30%	4.40%	4.70%	4.50%	7.00%
Estimated Annual On-Time Graduation Rate (2009-10)	85.70%	88.30%	70.20%	82.30%	82.00%	78.10%	75.70%
Estimated Annual Extended Graduation Rate (2009-10)	91.80%	90.90%	75.70%	90.10%	93.10%	87.70%	93.10%

Source: Washington State Report Card – Office of Superintendent of Public Instruction

King County K-12 Education Demography

Teacher Information	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Classroom Teachers	780	1,215	1,274	1,497	766	2,705	59,681
Average Years of Teacher Experience	12.9	9.7	11.2	11.5	11.7	11.4	12.4
Teachers with at least a Master's Degree	69.40%	67.70%	60.40%	67.10%	67.80%	64.80%	66.70%
Total number of teachers who teach core academic classes	644	763	1,100	1,327	669	2,396	50,095
Total number of core academic classes	3,371	2,206	5,131	5,413	3,242	10,940	247,010
% of classes taught by teachers meeting NCLB highly qualified (HQ) definition[1]	97.60%	99.30%	99.30%	100.00%	97.70%	99.50%	99.00%
% of classes in high poverty schools taught by teachers who meet NCLB HQ definition[1]	97.70%	100.00%	99.20%	100.00%	97.20%	99.40%	98.20%
% of classes in low poverty schools taught by teachers who meet NCLB HQ definition[1]	100.00%	99.10%	100.00%	100.00%	100.00%	99.50%	99.20%

K-12 Demographics	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
American Indian/Alaskan Native	2.00%	0.30%	0.90%	0.80%	1.00%	1.30%	1.70%
Asian	8.10%	28.60%	13.10%	16.70%	25.10%	19.10%	7.10%
Pacific Islander	2.40%	0.10%	4.00%	2.10%	0.30%	0.60%	0.90%
Asian/Pacific Islander	10.50%	28.70%	17.10%	18.90%	25.40%	19.70%	8.00%
Black	7.70%	3.10%	11.70%	11.90%	19.80%	19.20%	4.70%
Hispanic	19.90%	10.20%	22.50%	17.40%	18.90%	12.30%	18.90%
White	54.70%	49.90%	38.40%	43.90%	32.50%	42.70%	61.30%
Two or More Races	5.20%	7.80%	9.40%	7.00%	2.40%	4.80%	5.40%

1. NCLB Highly Qualified Teacher Information-
   NCLB Definition: Hold at least a bachelor's degree, hold full state teacher certification, and have demonstrated knowledge of subject matter and skill in the area assigned to teach.

Source: Washington State Report Card – Office of Superintendent of Public Instruction

King County Tax Information

	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Leasehold excise Tax	12.84%	12.84%	12.84%	12.84%	12.84%	12.84%	12.84%
Local B&O Tax Rate[1]	0.00%	.1496%	0.00%	0.00%	0.00%	.215%	0.00%
Local Sales Tax Rate	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Total Sales Tax Rate	9.50%	9.50%	9.50%	9.50%	9.50%	9.50%	9.50%
Property Tax[2]	13.91636	8.69551	12.76879	13.23478	12.21369	9.65803	12.68075

1. Manufacturing rate
2. Per $1000 of assessed value

Sources:
Individual municipalities
King County Department of Assessments , 2011 King County Codes and Levies
Association of Washington Cities (awcnet.org)

Source: Individual municipalities

Available Land in Incorporated King County

DEVELOPED Zoned Space Availability[1]	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Manufacturing	85,290,480	5,070,527	12,230,846	Data unavailable	Land: 16,829,276 Building: 13,718,410 (both MFG and DIST)	56,766,708	29,403,000
Distribution	36,459,720	8,606,321	Included in Manufacturing	Data unavailable	Land: 13,533,343 Building: 13,718,410 (both MFG and DIST)	Included in Manufacturing	Included in Manufacturing
Office	62,421,480	73,031,706	65,456,205	Data unavailable	Land: 33,689,535 Building: 6,774,292	127,327,166	6,534,000

UNDEVELOPED Zoned Space Availability[1]	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Manufacturing	12,980,880	2,420,534	4,476,204	7,971,480	Land: 34,712,700 Building: data unavailable	18,472,939	13,068,000
Distribution	1,916,640	3,047,594	Included in Manufacturing	Included in Manufacturing	Land: 47,952,139 Building: data unavailable	Included in Manufacturing	Included in Manufacturing
Office	5,662,800	13,049,621	32,999,322	Data unavailable	Land: 32,073,258 Building: data unavailable	64,396,649	Included in Manufacturing

1. Area measured in square feet

Source: Provided by individual municipalities

Available Land in Unincorporated King County

DEVELOPED Zoned Space Availability[1]	Unincorporated King County
Manufacturing	Data not available
Distribution	Data not available
Office	Data not available

DEVELOPED Zoned Space Availability[1]	Unincorporated King County
Manufacturing	8,158,800
Distribution	Included in manufacturing
Office	5,702,000

1. Area measured in square feet

Source: 2007 Buildable Lands Report

Airports in King County

	King County	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Airport(s) within county limits by name	Seattle-Tacoma International Airport (SEA-TAC) and King County International Airport (KCIA).	Auburn Municipal Airport - Dick Scobee Field	None	None	None	Renton Municipal Airport, Clayton Scott Field (see below for additional information)	None	None
Runway access types i.e. cargo and passenger	SEA-TAC: scheduled passenger, cargo and corporate general access. KCIA: Cargo, corporate general access, general aviation.	Passenger / Corporate Executive FAA Rating ARC: B-I	N/A	N/A	N/A	FAA-designated "reliever" airport. Boeing 737 are built, tested and flown off of location, Regional aviation services for air charter, air taxi, corporate, business and recreational	N/A	N/A

Source: Provided by individual municipalities and county

Airports in King County Cont.

	King County	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Runway length and load bearing capacity	SEA-TAC: three runways, 11,901 feet; 9,426 feet; 8,500 feet respectively; load-capacity = 888,000 lb; 800,000 lb; 1,157,000 lb dual double tandem respectively. KCIA: one major runway, 10,000 feet, load-capacity = 833,000 lb.	3,450 feet 12,500 lbs	N/A	N/A	N/A	The Airport has a single 5,382 feet long (200 feet wide) Load capacity = 340,000 lbs w/tandem gear.	N/A	N/A
Physical updates/ improvements scheduled	SEA-TAC: by 2016, major re-construction of Runway 16C-34C and modifications to taxiways to improve airfield operations. KCIA: All facilities have been upgraded within the past 8 years; taxiway improvements and safety improvements during 2012.	Runway extension to 4,003 feet. -	N/A	N/A	N/A	2012 Performance Based Navigation - RNP approach to runway 16/34, 2012/2013 Taxiway Bravo Reconstruction, 2012 Airside/Landside Separation - Apron B plus possible need to relocate of 1000'. of Perimeter Road, 2012 storm water system upgrade, 2015 lower jet blast fence	N/A	N/A

Source: Provided by individual municipalities and county

Rail in King County

	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Identify closest major rail depot access to manufacturing locations	Downtown Auburn Burlington Northern Santa Fe and Union Pacific Railways	Auburn, WA (BNSF rail spur in Redmond/ Kirkland not in use)	Auburn, WA	Several hubs/spurs throughout Kent Industrial Valley- Union Pacific & Burlington Railroad lines	BNSF Railroad spur	Port of Seattle	BNSF and UP both have rail yards in Tukwila or South Seattle for loading containers and trailers.
Transportation time and distance from major rail depot to manufacturing location(s)	0-2 miles	N/A	15 minutes, 10 miles.		The Tukwila intermodal rail yard is approximately 5 miles from the Boeing plant. The transportation time is approximately 15 minutes by road and 1/2 hour by rail between the two locations.	Depends on which Boeing location	1 to 4 miles; 5 to 15 minutes.

Source: Provided by individual municipalities

Deep Water Ports in King County

	Auburn	Bellevue	Federal Way	Kent	Renton	Seattle	Tukwila
Transportation time of aerospace goods from seaport to manufacturing location(s)	Port of Tacoma - 15 miles / Port of Seattle - 20 miles	NA	Port of Tacoma is located within 5 miles, 10-15 minutes away.	17 miles from both Ports of Tacoma and Seattle	Port of Seattle seaport and the Boeing site is approximately 1/2 hour by road and 1 hour by rail.	Depends on which Boeing location	1 to 4 miles; 5 to 15 minutes.
Do rail connections exist between seaport and manufacturing locations?	Yes	NA	No	Yes	Yes	Yes	Yes, in some cases.

Source: Provided by individual municipalities

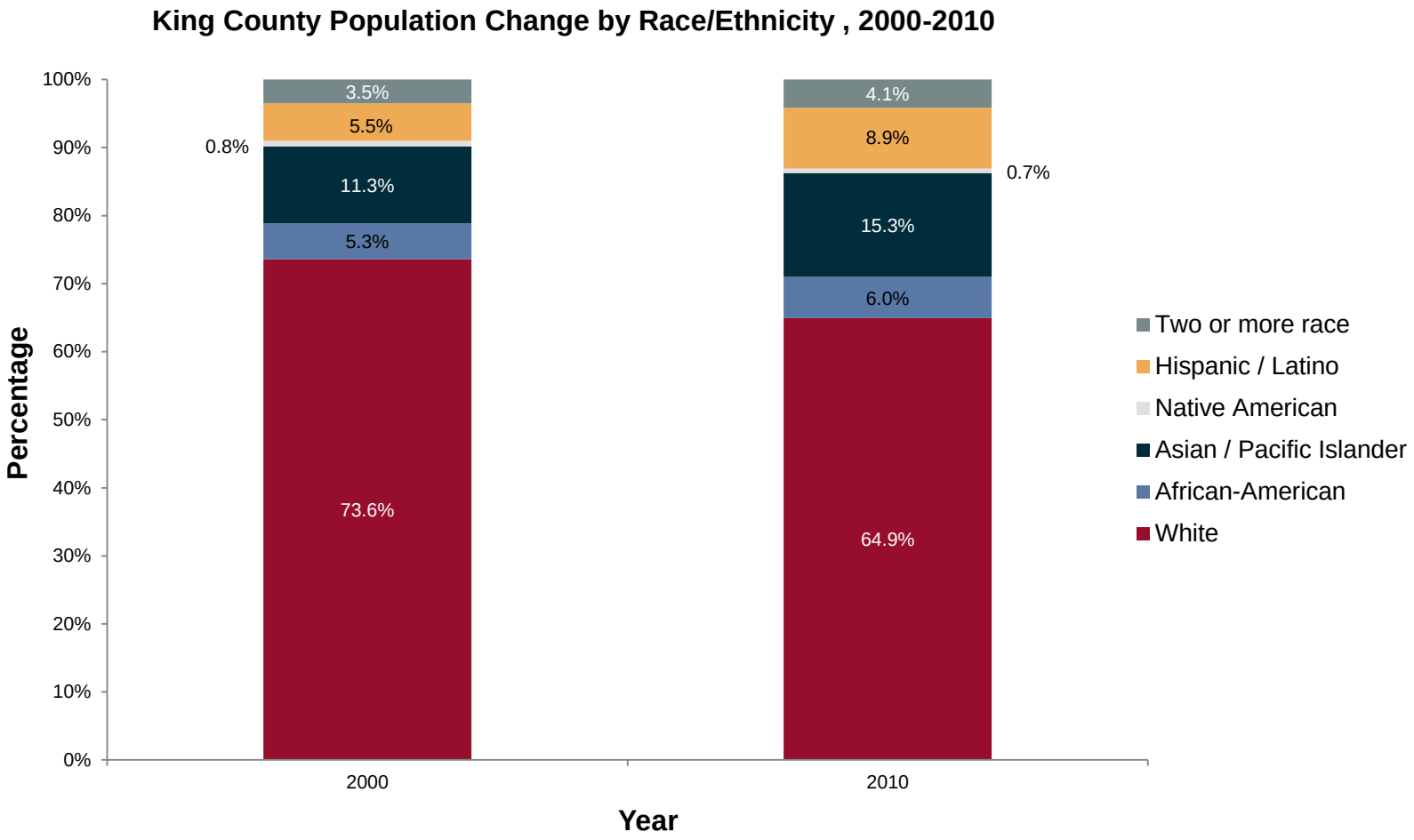
Revised Code of Washington (RCW)
Aerospace Related Tax Law

RCW	Description
82.08.020	Retail sales tax on retail sales including aircraft
82.04.050	Retail sales definition includes aircraft sales and parts
82.08.0262	Tax exemption on the sale of airplanes (i) to the United States government; (ii) for use in conducting interstate or foreign commerce; or (iii) for use in providing intrastate air transportation by a commuter air carrier.
82.48	Excise tax on aircraft used in the State of Washington
82.48.100	Tax exemption of RCW 82.48 for government and commercial flying that constitutes interstate and foreign commerce. Tax exemption does not include aircraft to non-airlines and non-governmental entities
47.68.250	Registration of an aircraft including an annual fee for non-airline and non-government aircraft. Exclusions to registration include all government and commercial flying that constitutes interstate and foreign commerce.
458-20-XXX	Draft DOR legislation to address tax avoidance that is intended to apply retroactively, and will likely affect many aircraft owners in Washington operating under an LLC. LLCs are used to comply with Federal Aviation Regulations which do not permit a single purpose entity to be the operator of an aircraft.

Sources: State Department of Revenue Websites

Demographics of King County from 2000 – 2010

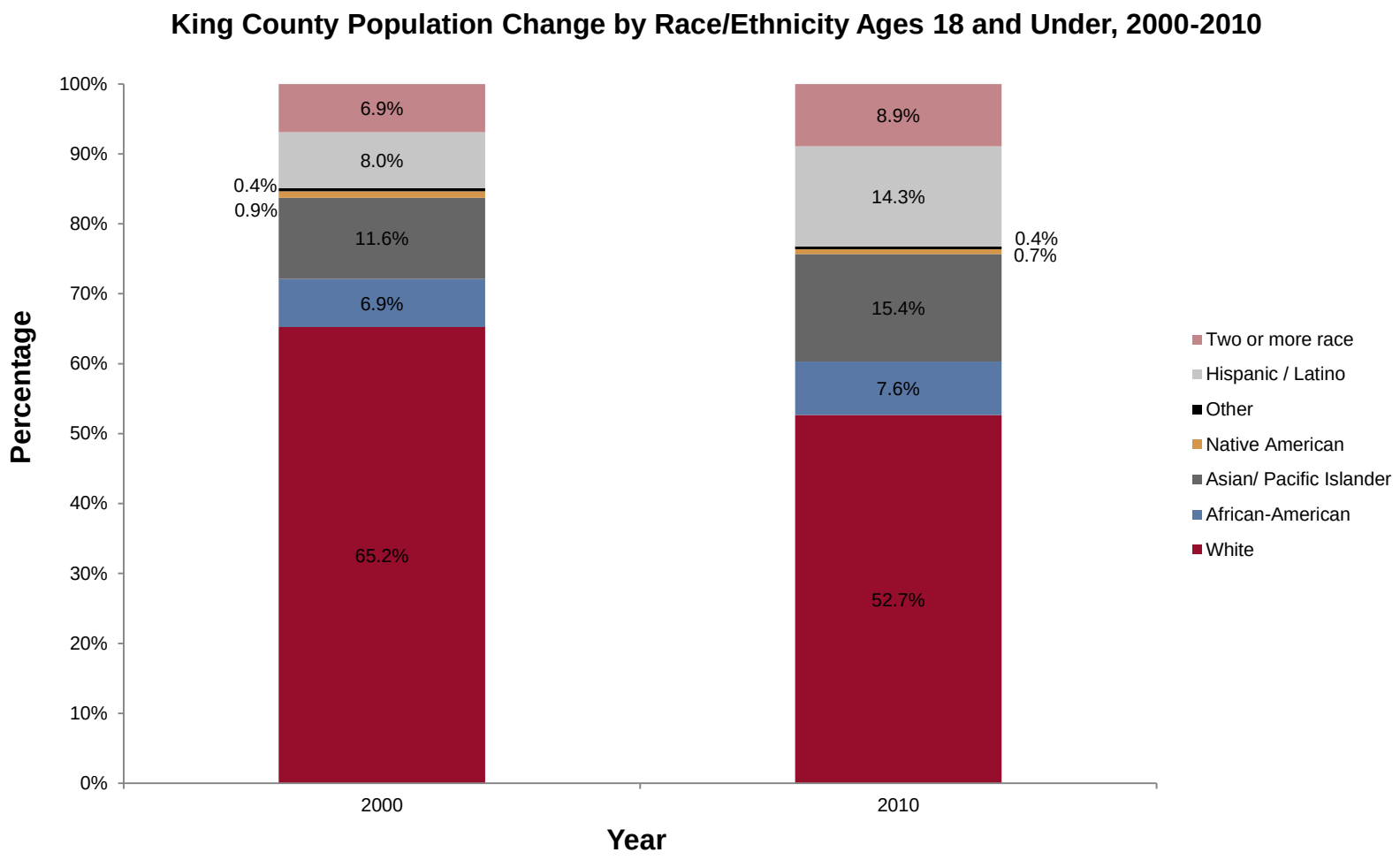
King County has seen a 25% increase in minority population between 2000 and 2006.



Source: U.S. Census Bureau, PL 94-171 Redistricting data, 2010 and 2000

Demographics of King County from 2000 – 2010 Ages 18 and Under

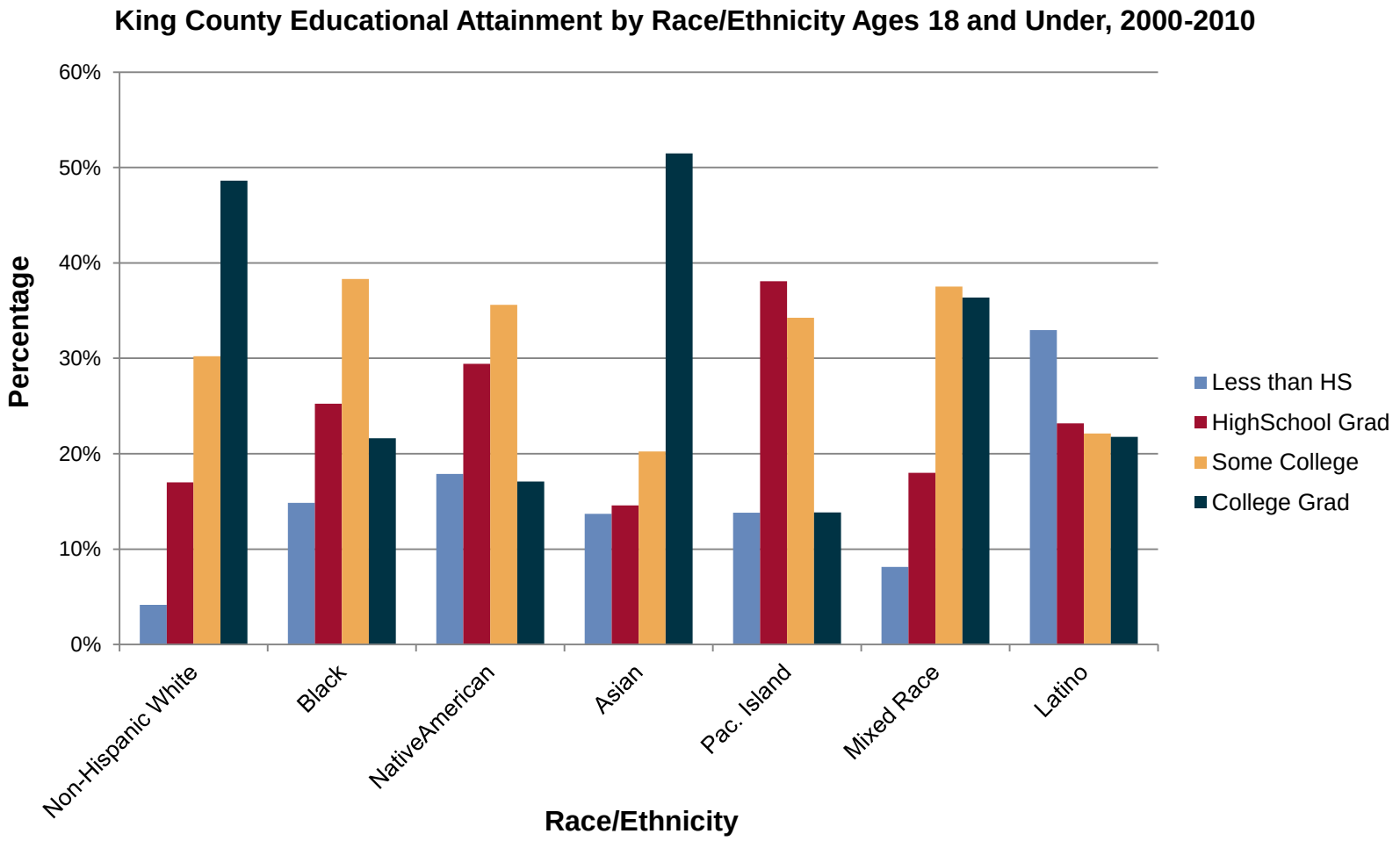
King County's minority population under the age of 18 has grown to 45 percent.



Source: U.S. Census Bureau, PL 94-171 Redistricting data, 2010 and 2000

King County Educational Attainment by Race/Ethnicity

Educational attainment by King County adults differ between race/ethnicity.



Source: American Community Survey 2006-10 five-year data