



Realities of Cost As an Independent Variable (CAIV)

Stakeholder Perceptions

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Cost As an Independent Variable (CAIV)

Stakeholder Perceptions – Objectives and Approach



- Anecdotal evidence shows that while CAIV is often cited as a key element of successful program development, it is often limited in scope or not addressed
- A survey was sent to over 125 functional managers in both industry and government to determine their perceptions on CAIV application
- Survey questions asked how stakeholders would invest to determine in future phase costs (CAIV) during each “development” phase
- Additional questions regarding CAIV issues such as effectiveness, budget support, standard work and accuracy, were included
- Respondent demographics were captured and used to identify differences in perceptions of CAIV by function and organization
- Comments from 70 respondents were received and summarized
- Conclusions and Next Steps were identified

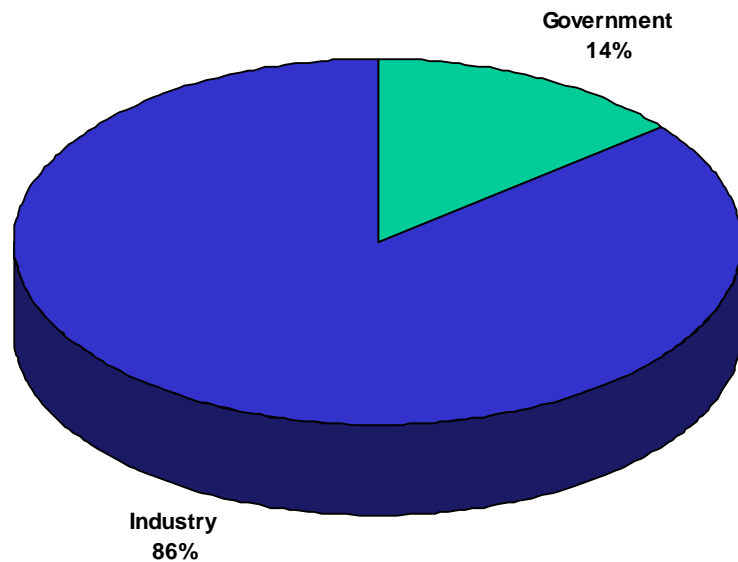
Cost As an Independent Variable (CAIV)

Survey Respondent Demographics

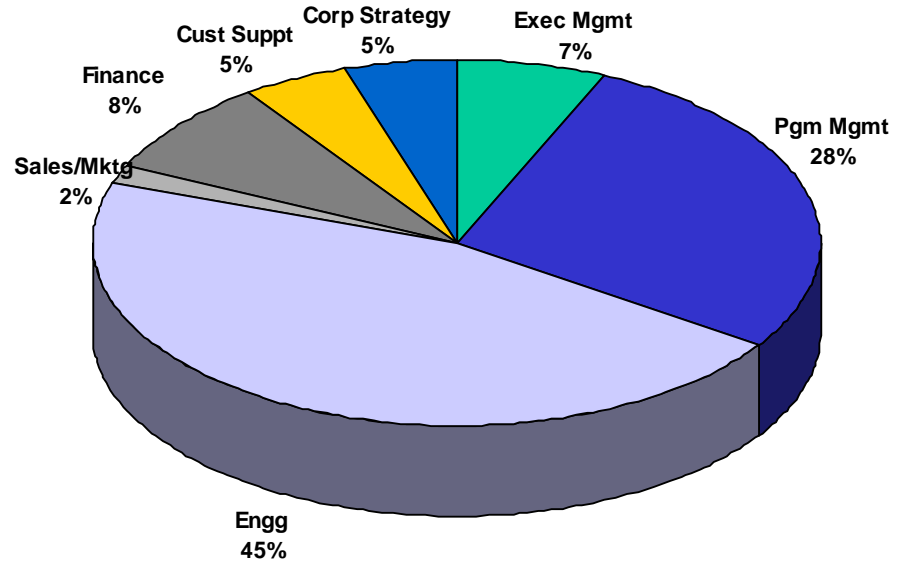


Survey respondents represent both Government and Industry stakeholders in many functional organizations – distribution is as follows:

Government or Industry (70)



Current Functional Organization (69)



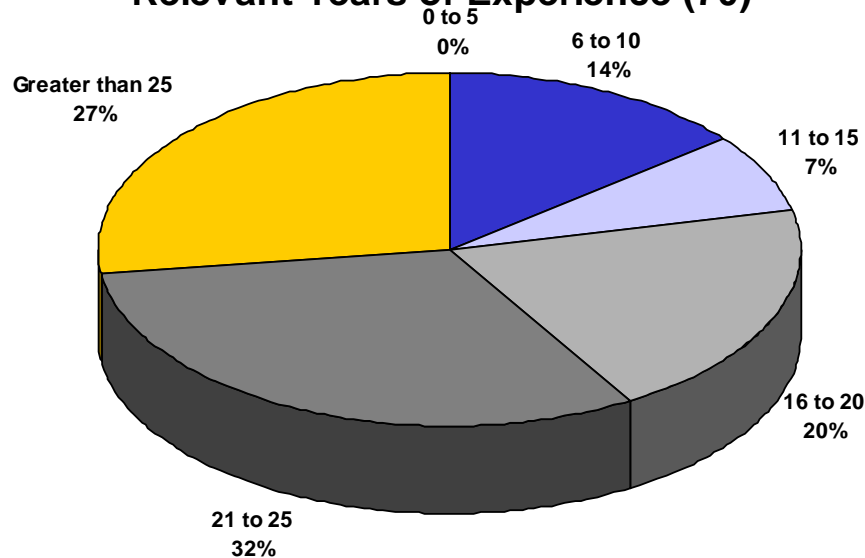
Cost As an Independent Variable (CAIV)

Survey Respondent Demographics

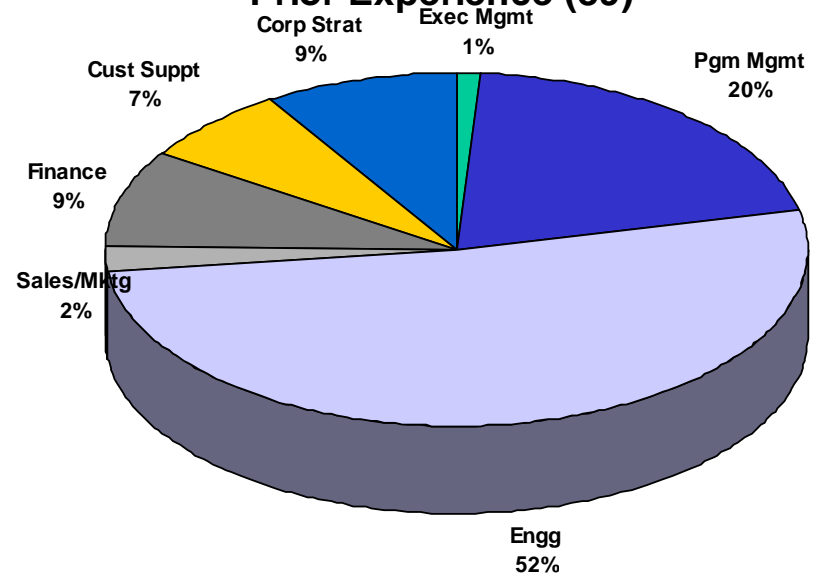


More than three quarters of respondents have more than 15 years experience and most have worked in other functional areas

Relevant Years of Experience (70)



Prior Experience (89)*



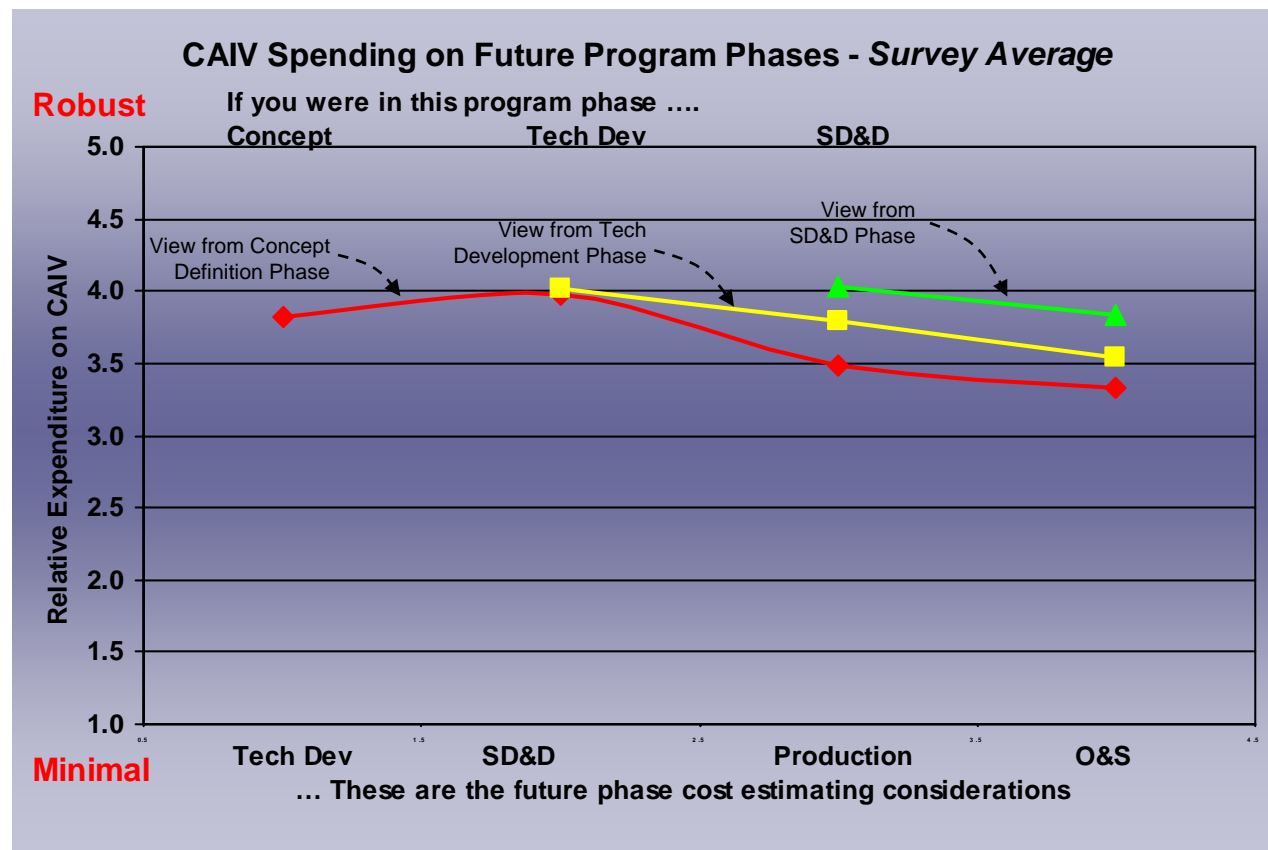
*Respondents may select more than one Category

Support for Future Phase Cost Analysis

Survey Average – view from each program phase



On average, respondents indicated that the “next” program phase was the most important to estimate – with less effort on the Life Cycle view

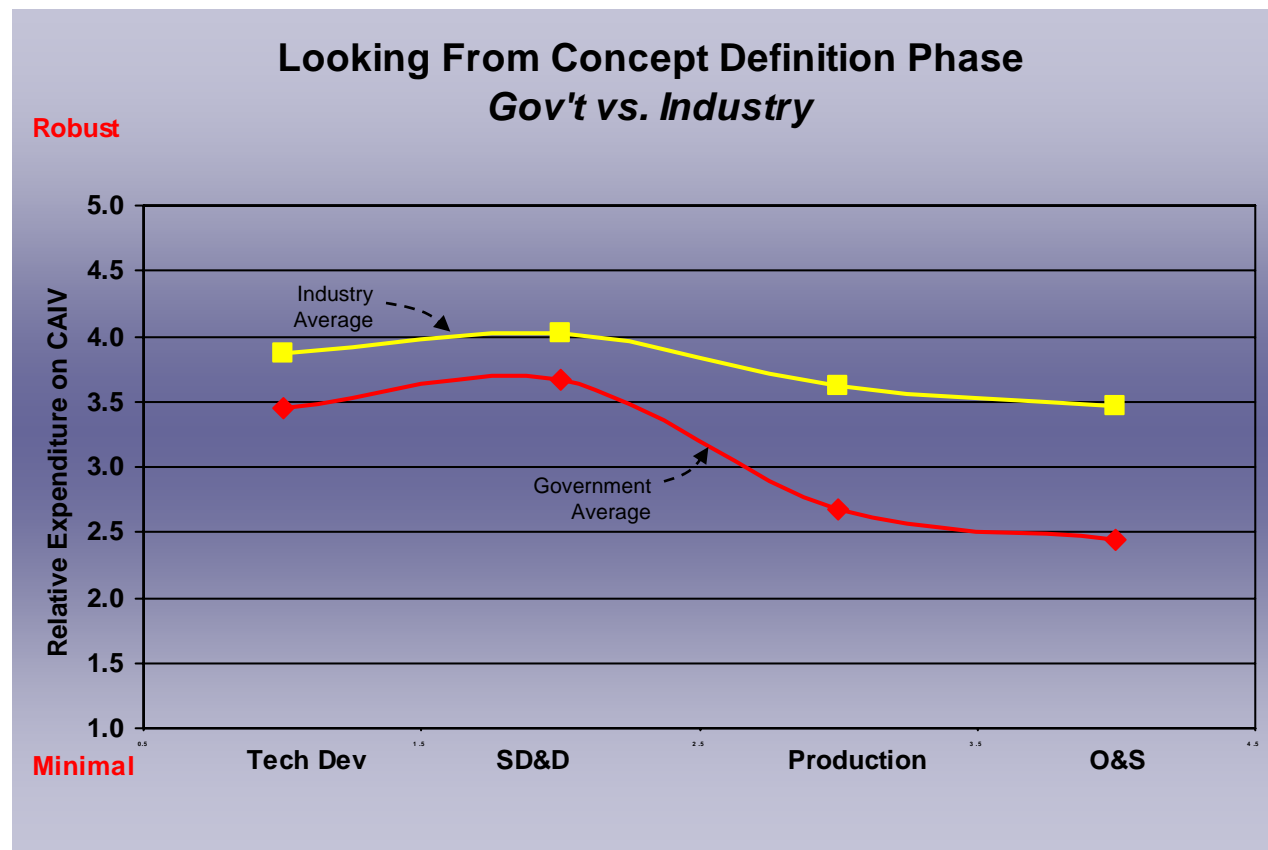


Support for Future Phase Cost Analysis

Survey Average – government vs. industry



On average, industry supports more CAIV spending on later phases than Government respondents when viewed from the Concept Definition Phase

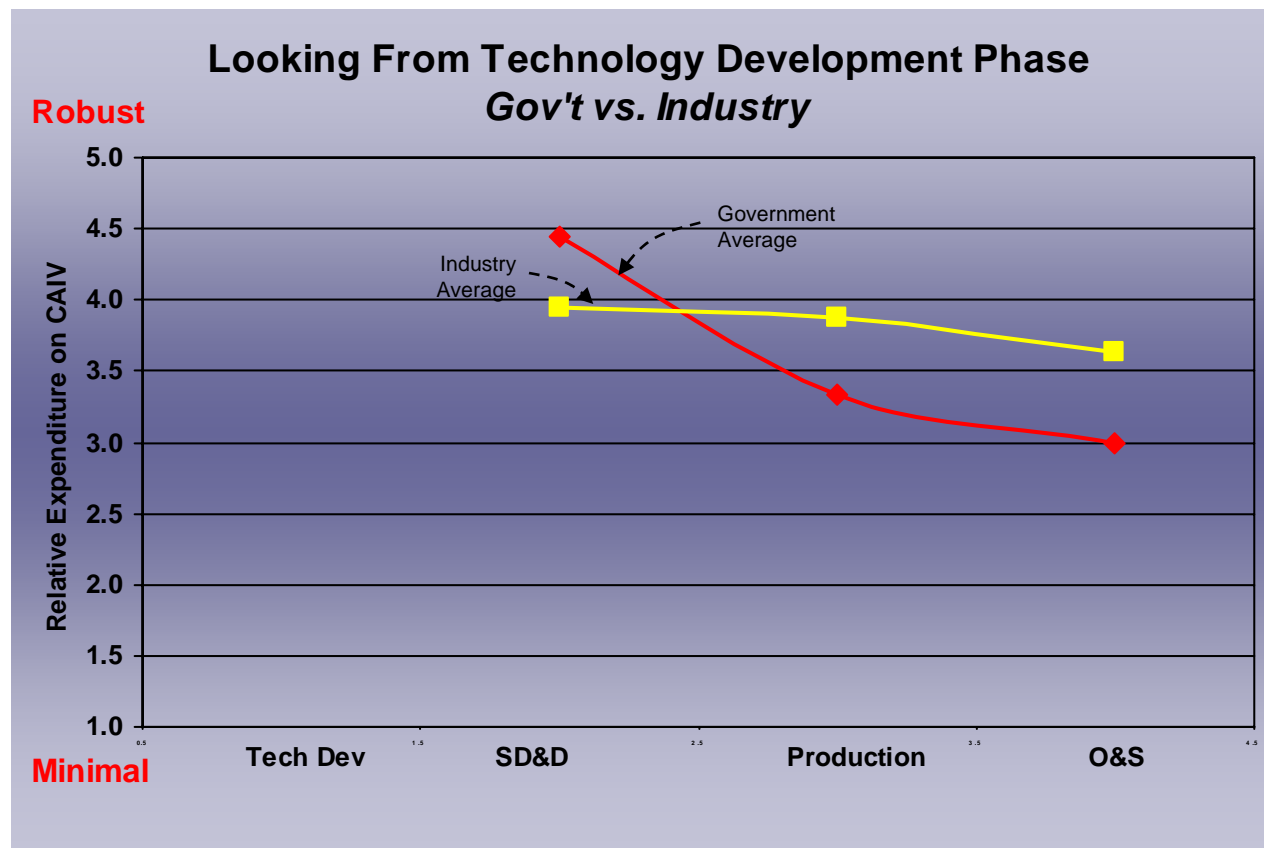


Support for Future Phase Cost Analysis

Survey Average – government vs. industry



But, Government respondents support more CAIV spending on Production and O&S phases than Industry when viewed from the Tech Development Phase

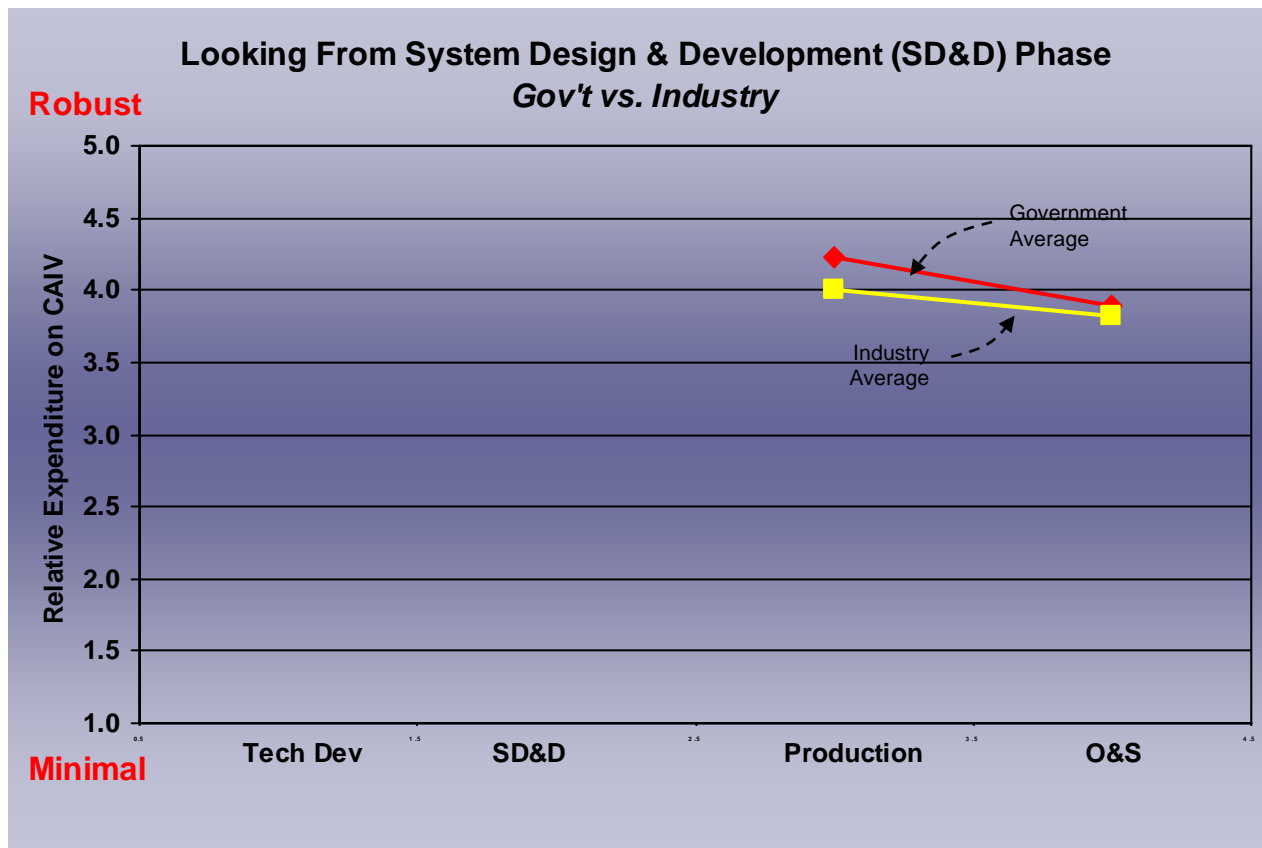


Support for Future Phase Cost Analysis

Survey Average – government vs. industry



Both Government and Industry respondents indicate high levels of support for Production and O&S cost analysis when in the SD&D Phase

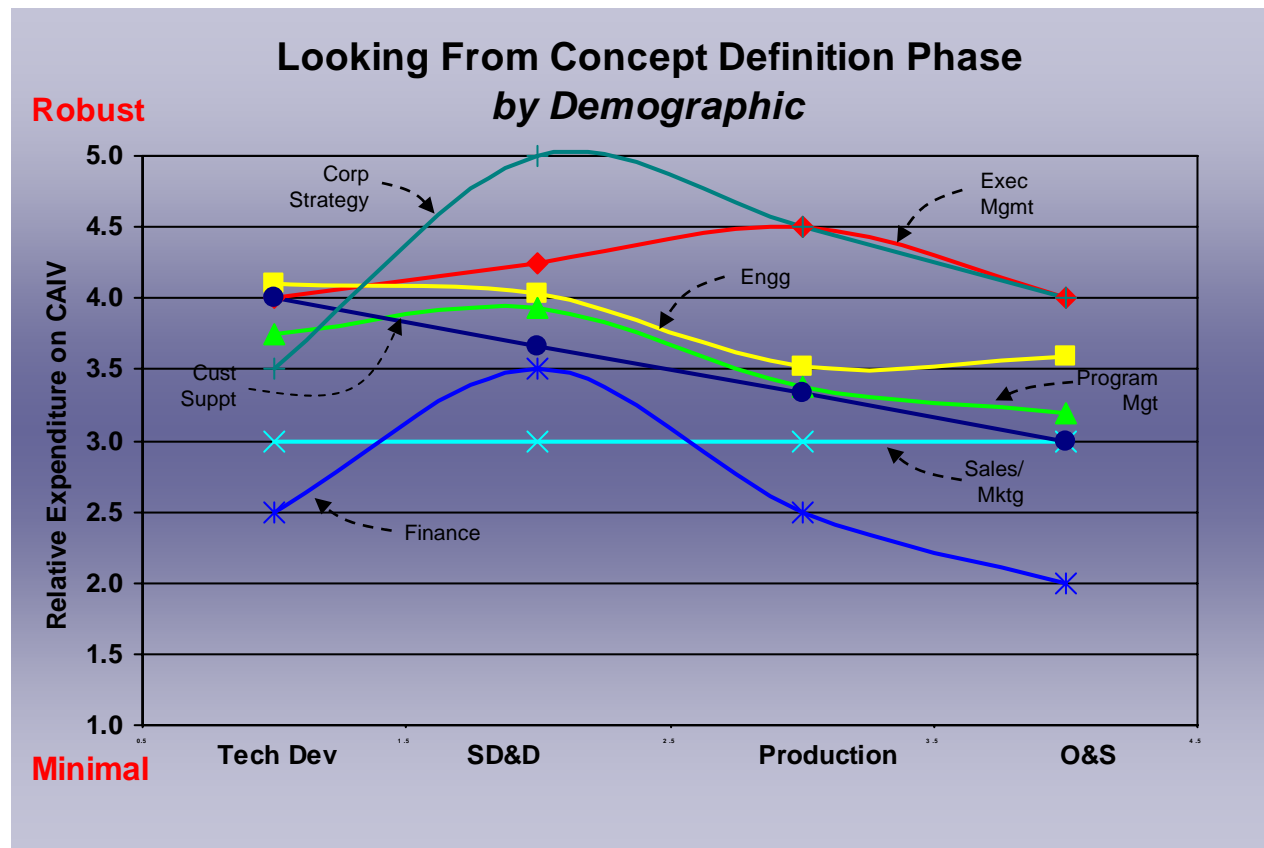


Support for Future Phase Cost Analysis

Survey Averages – view from Concept Phase



Corp Strategy and Executive Mgmt recognize the importance of future phase estimates as compared to other functional stakeholders

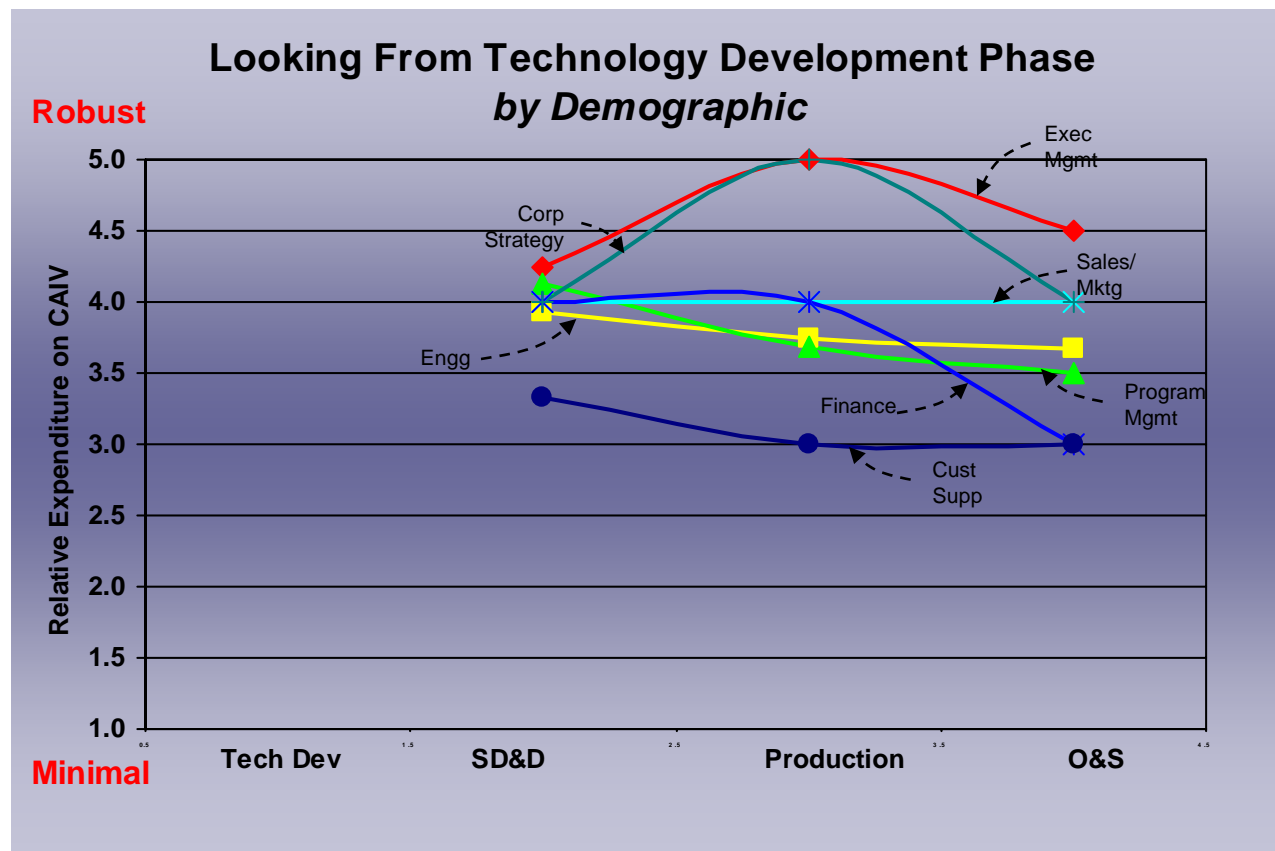


Support for Future Phase Cost Analysis

Survey Averages – view from Tech Dev Phase



Again, Corp Strategy and Executive Mgmt recognize the importance of future phase estimates as compared to other functional stakeholders

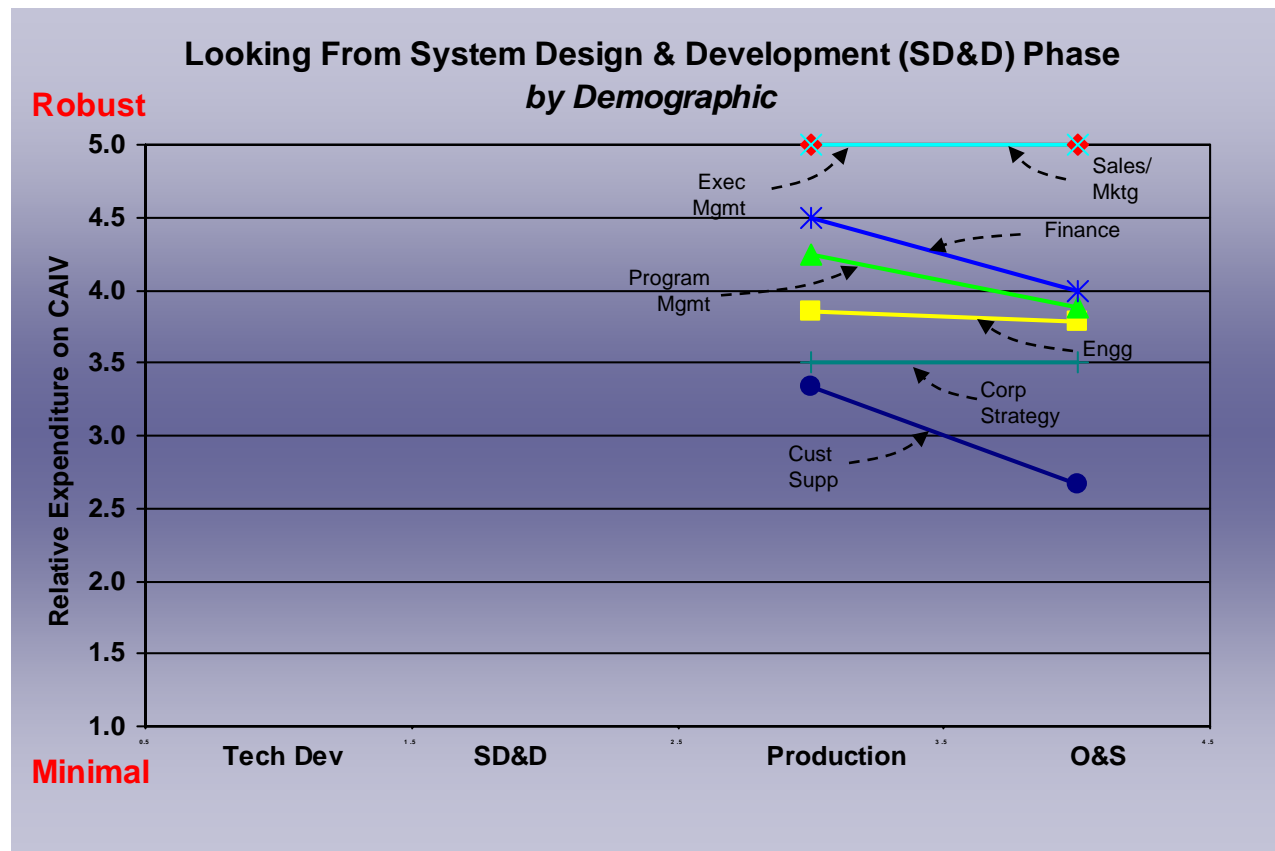


Support for Future Phase Cost Analysis

Survey Averages – view from SD&D Phase



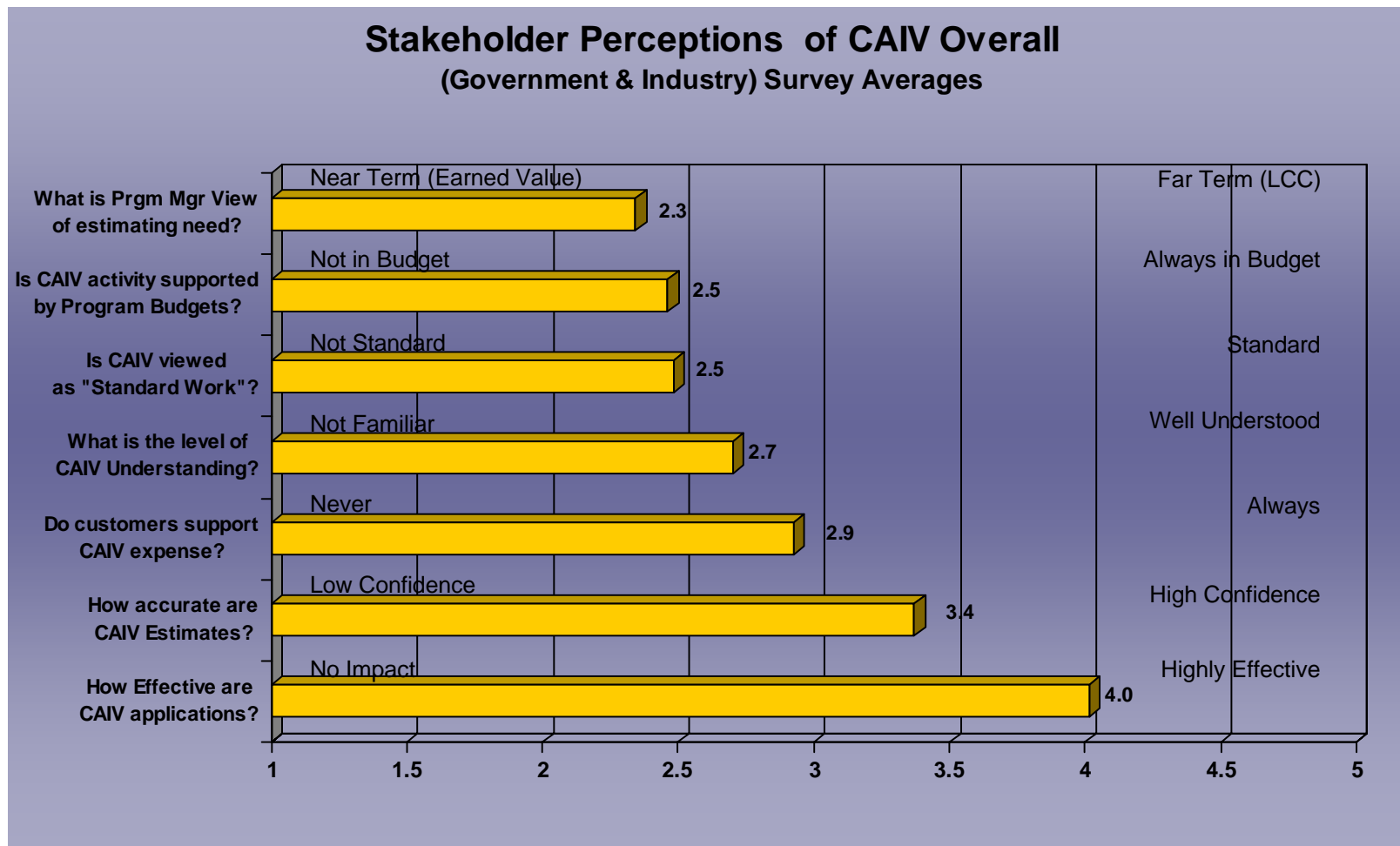
Executive Mgmt continues to be strong proponents for cost estimating in Production and Support phases once SD&D begins with Finance and Program Mgmt recognizing the near term need



CAIV Stakeholder Perceptions



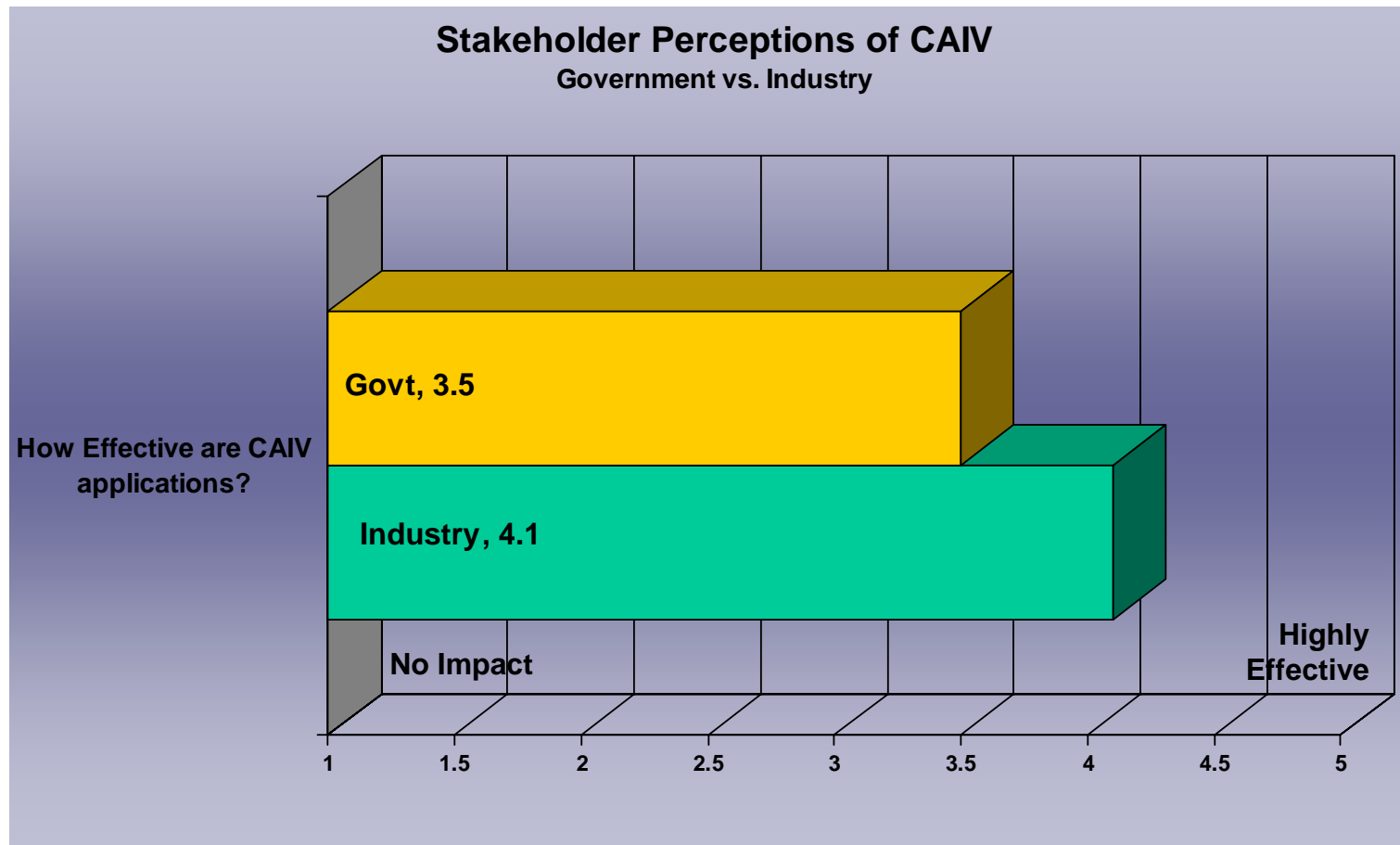
The average respondent believes strongly in CAIV effectiveness but recognizes that limited resources have been available



CAIV Stakeholder Perceptions



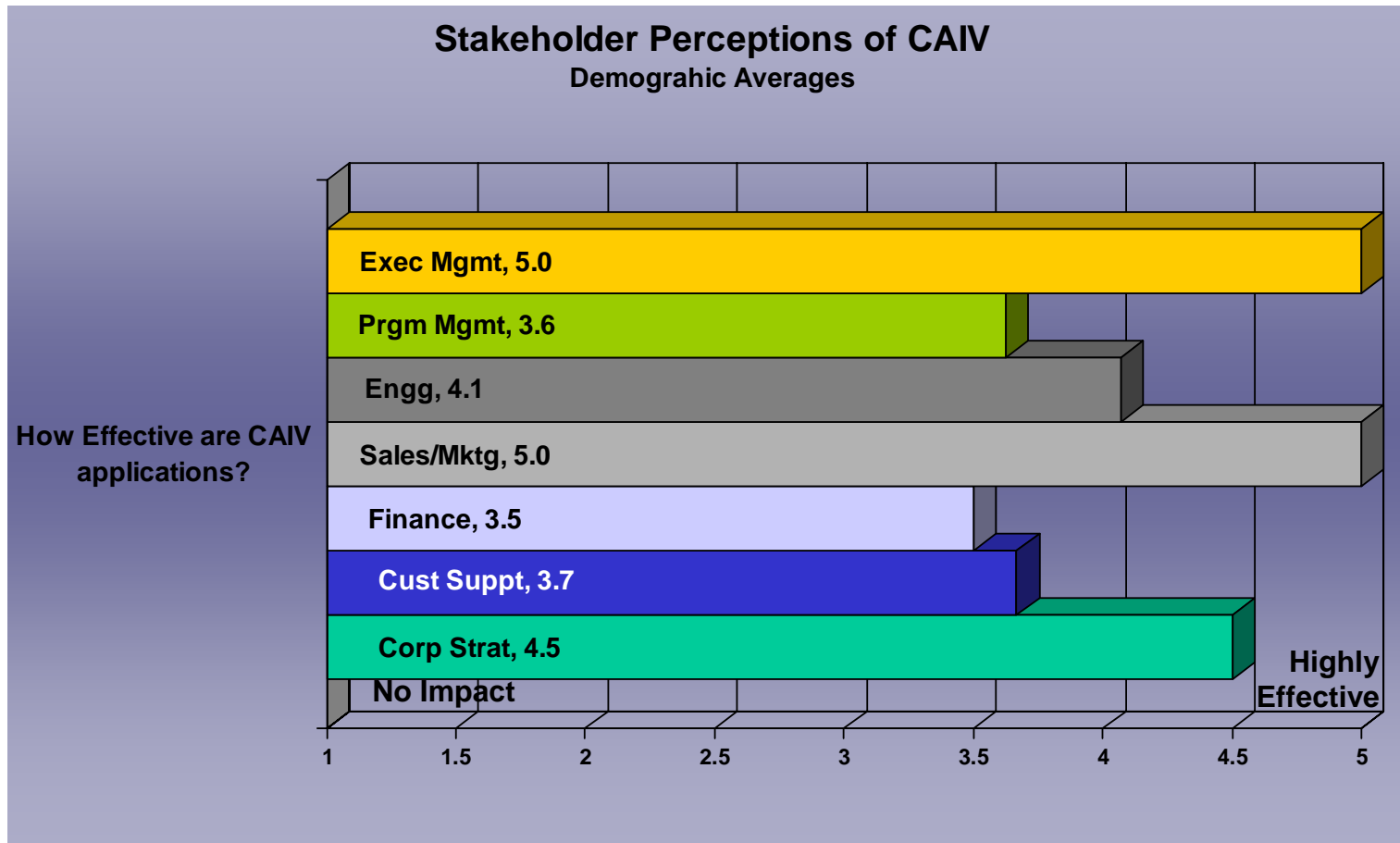
Industry respondents believe that well supported CAIV applications are more effective than Government respondents (but both are positive)



CAIV Stakeholder Perceptions



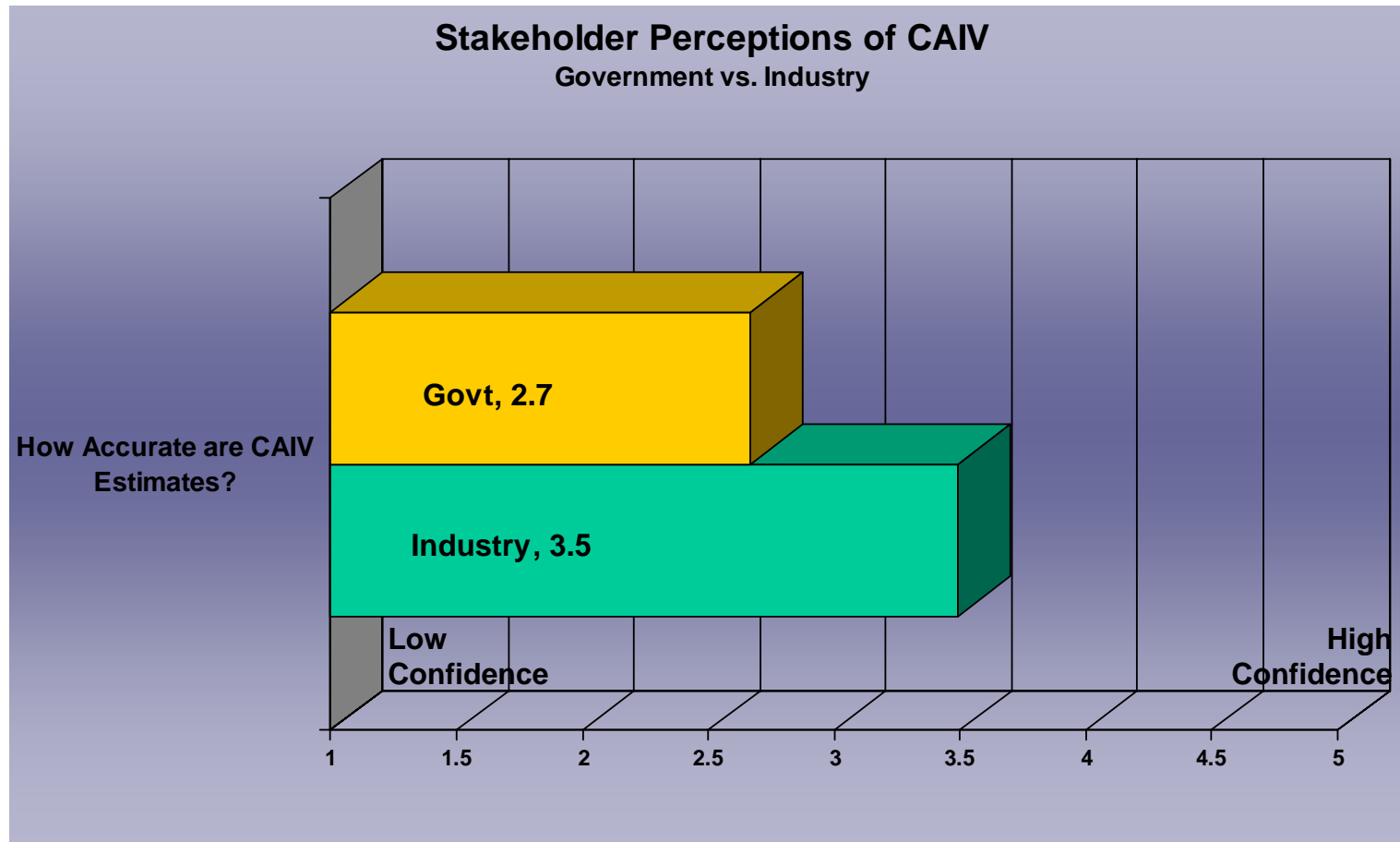
While nearly all stakeholders believe that CAIV applications can be effective, Executive Mgmt, Sales and Corp Strategy show the highest support



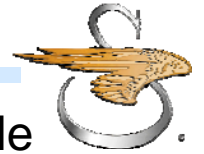
CAIV Stakeholder Perceptions



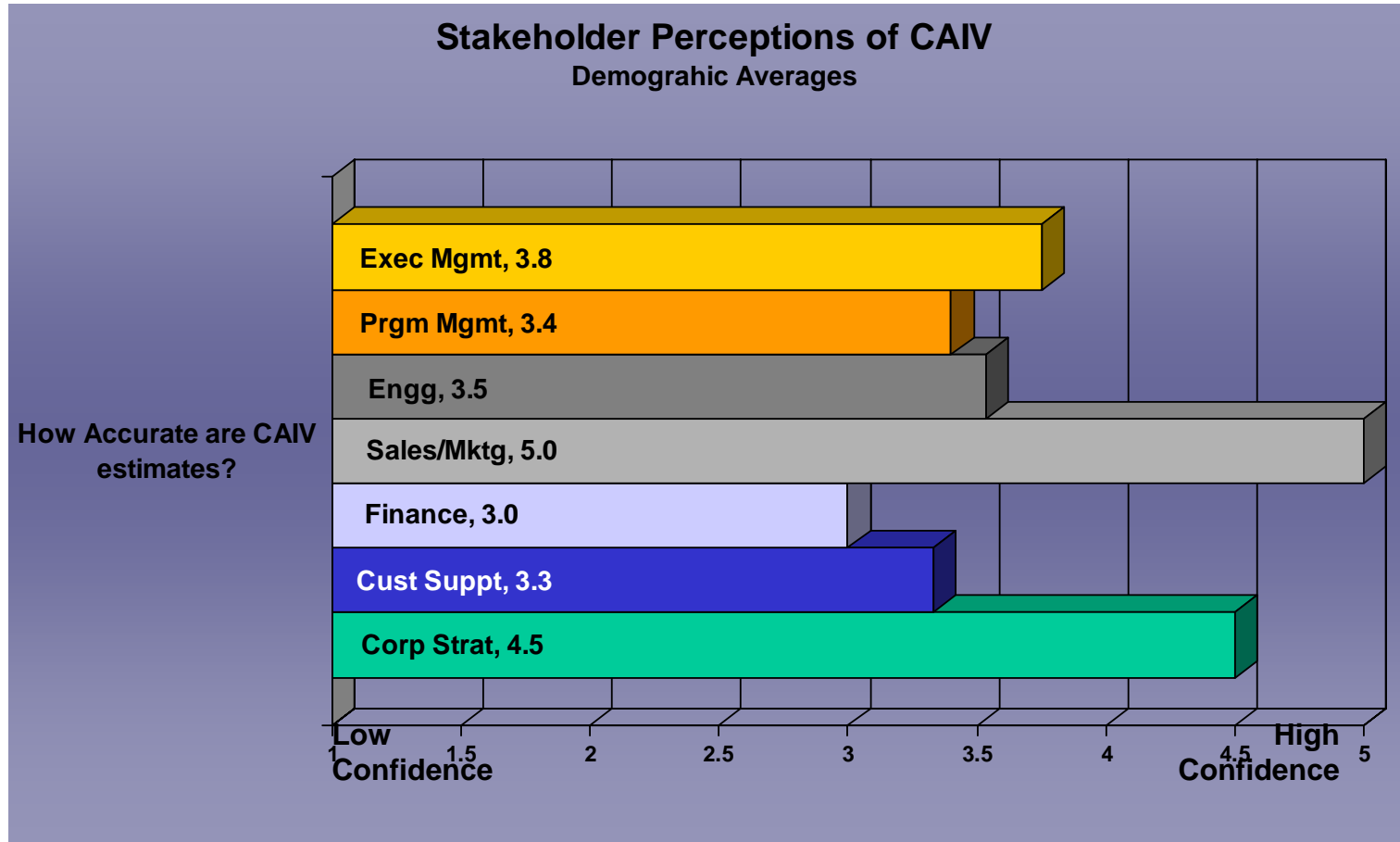
However, stakeholders question the overall accuracy of future phase estimates – especially government



CAIV Stakeholder Perceptions



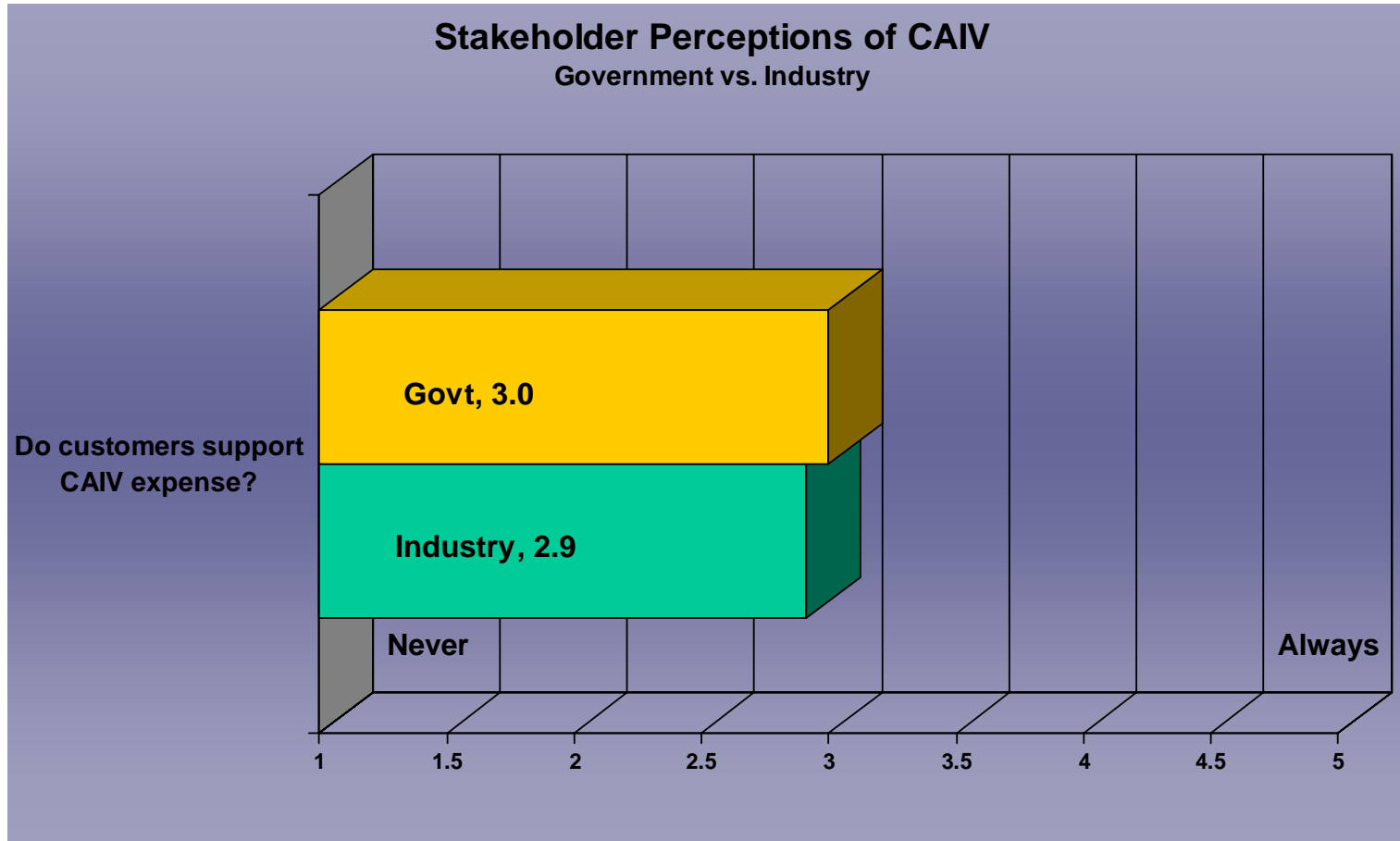
Finance has the least confidence in the accuracy of CAIV estimates while most respondents have only average confidence



CAIV Stakeholder Perceptions



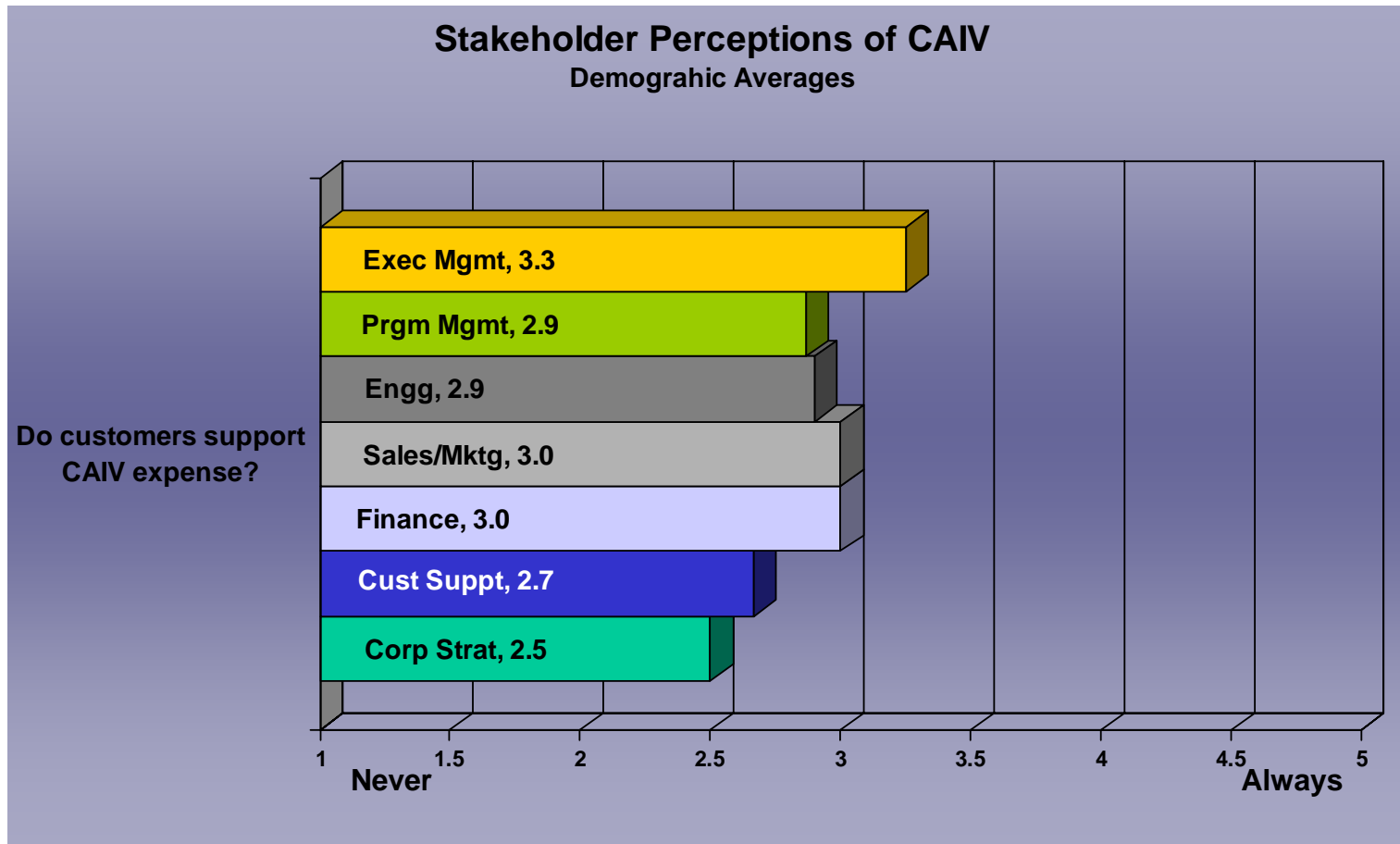
Government and Industry both perceive that customers only modestly provide resources for CAIV activity



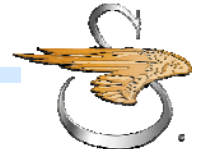
CAIV Stakeholder Perceptions



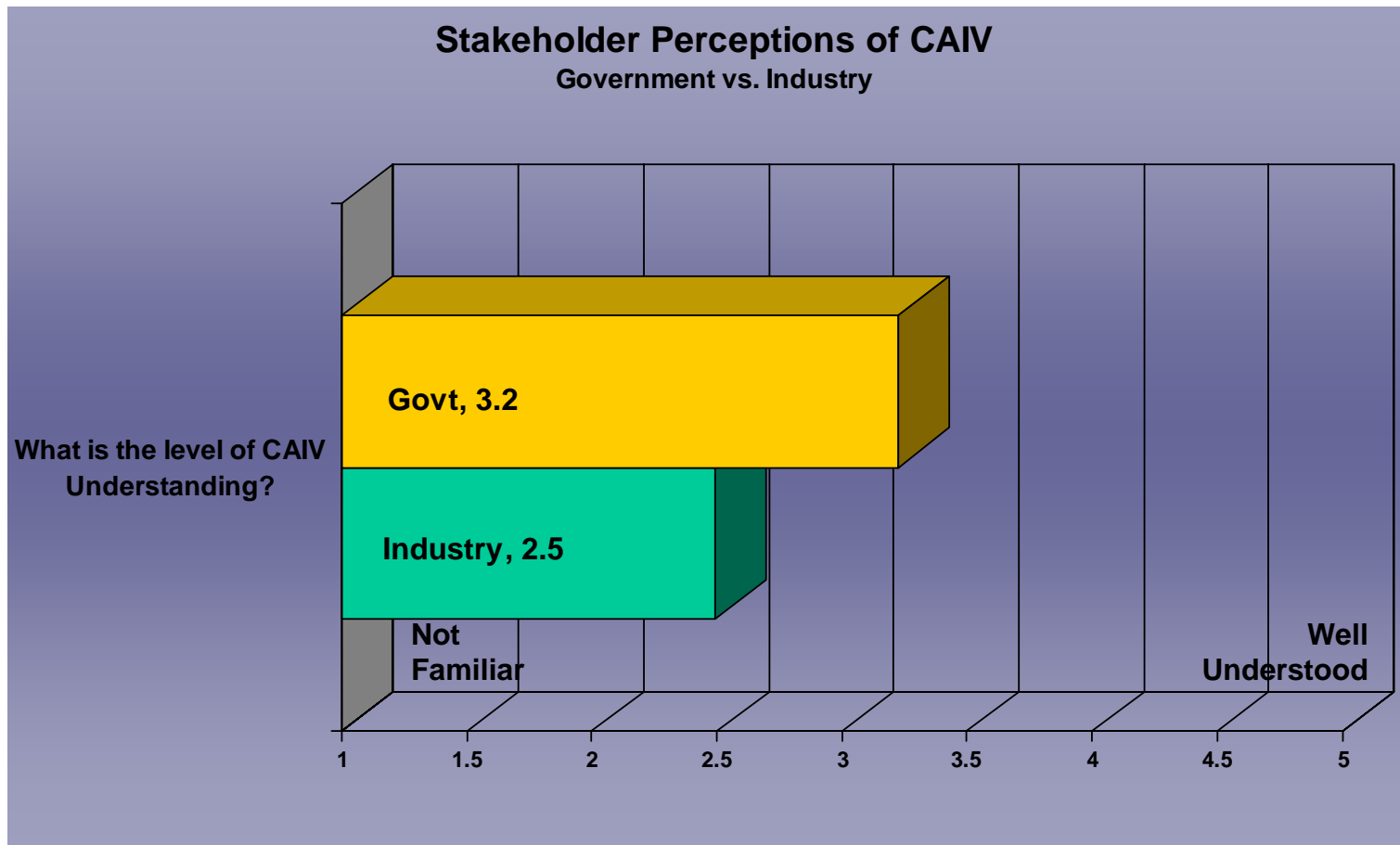
Functional perceptions vary only slightly on customer's support for CAIV



CAIV Stakeholder Perceptions



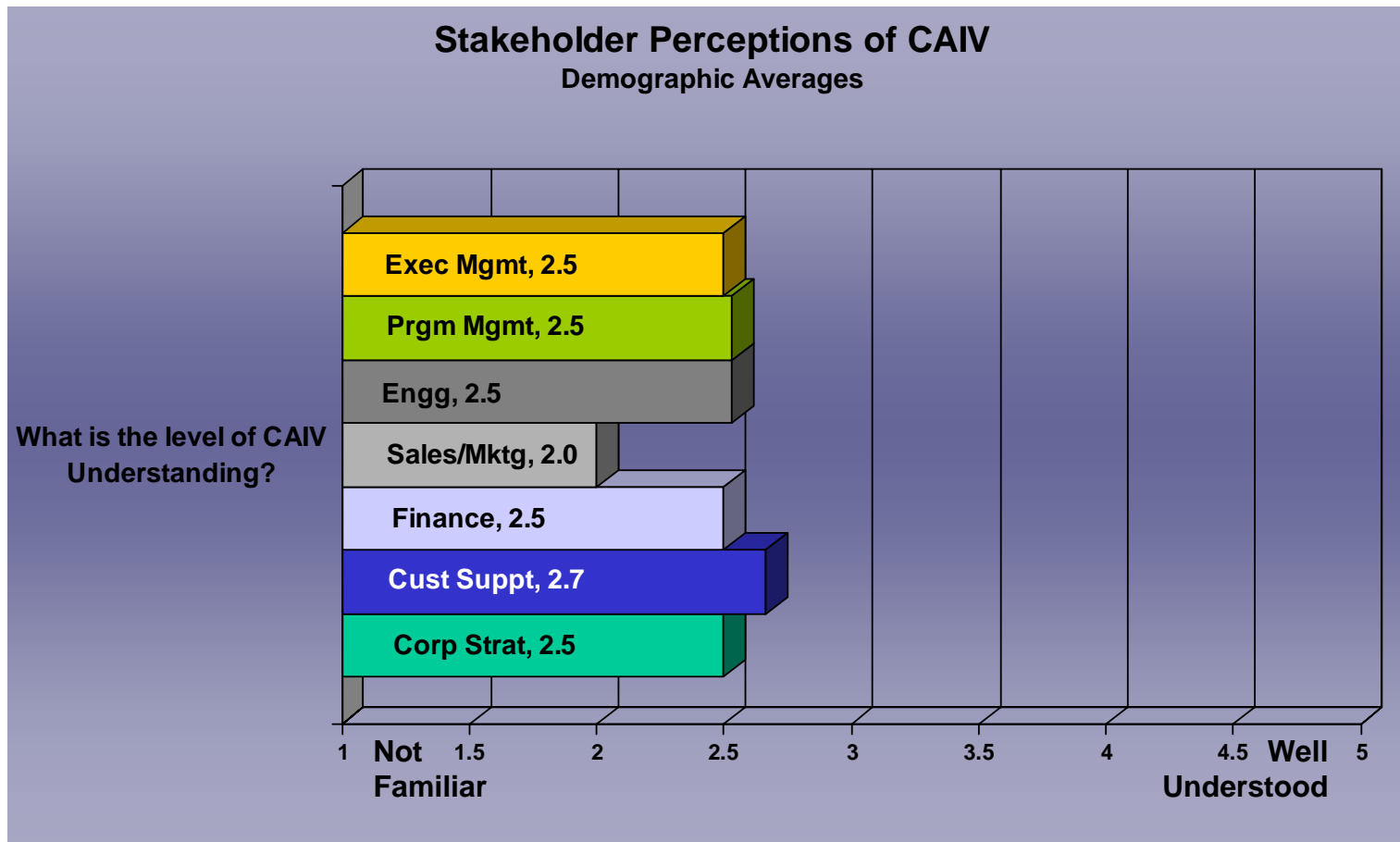
Most respondents indicate that they believe stakeholders have less than average understanding of CAIV methods and objectives – Government perception of understanding is higher than industry



CAIV Stakeholder Perceptions



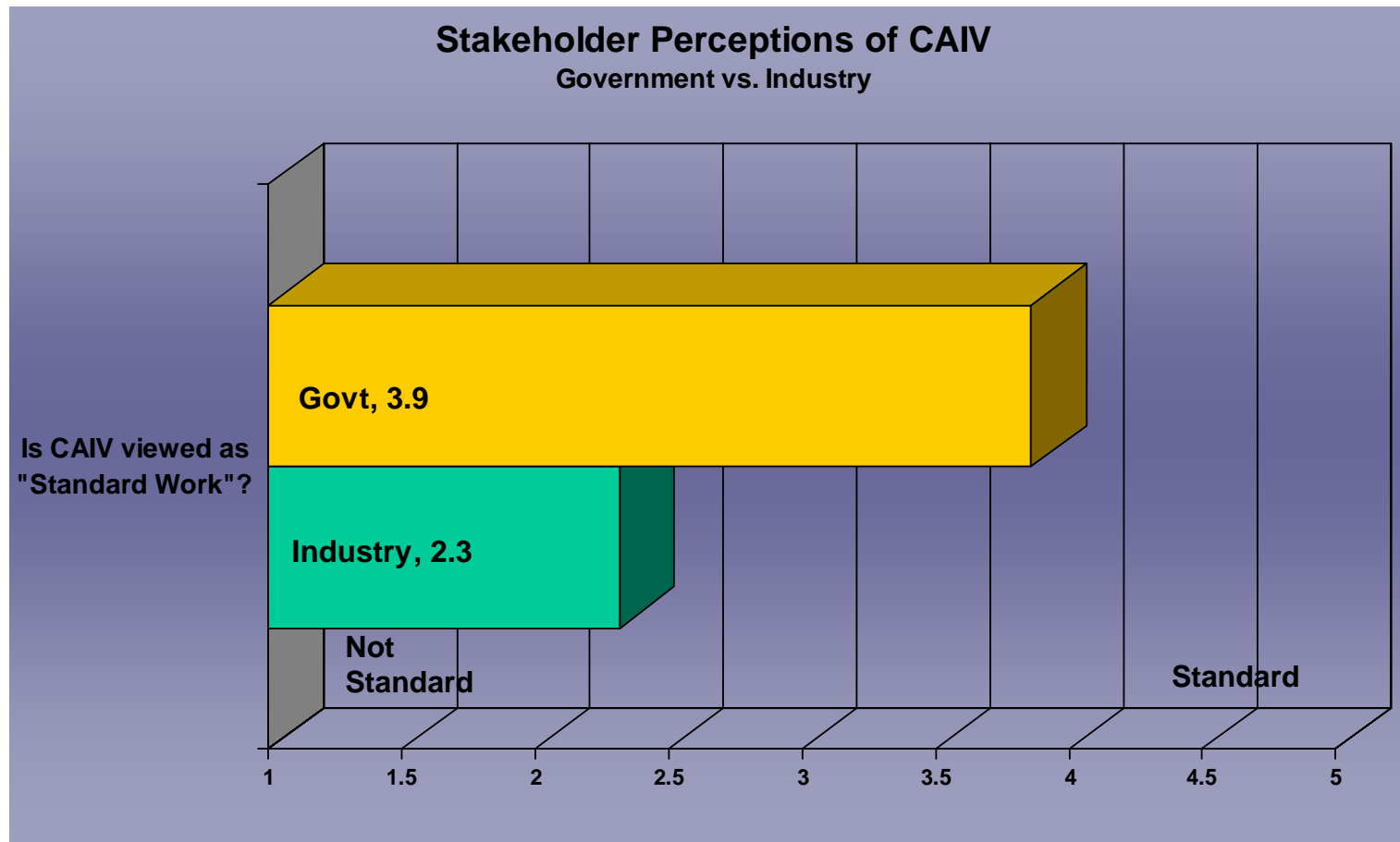
Many from industry do not fully understand CAIV applications – with several N/A responses from finance groups



CAIV Stakeholder Perceptions



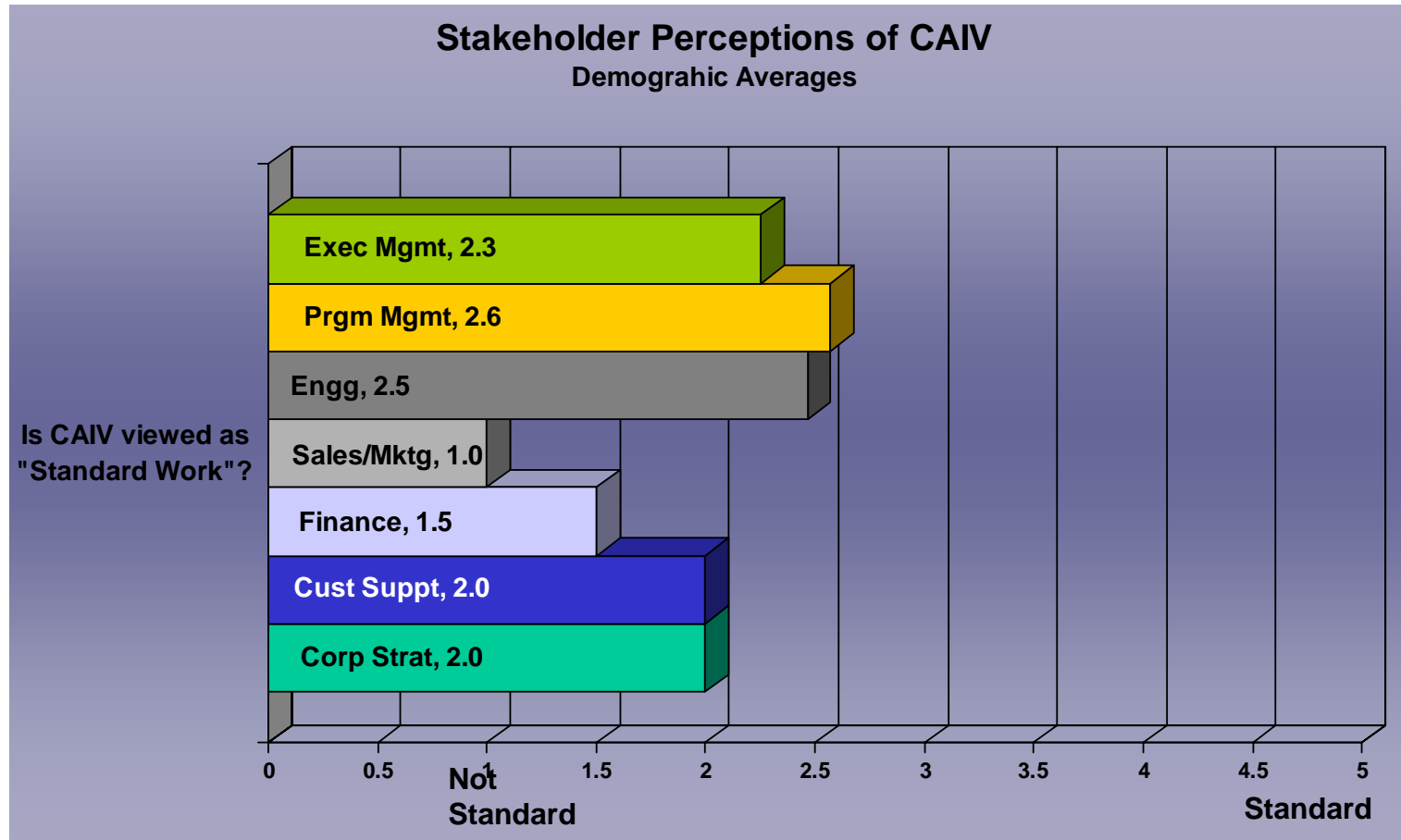
Government strongly views CAIV as “Standard Work” while Industry does not consider CAIV as standard for most programs



CAIV Stakeholder Perceptions



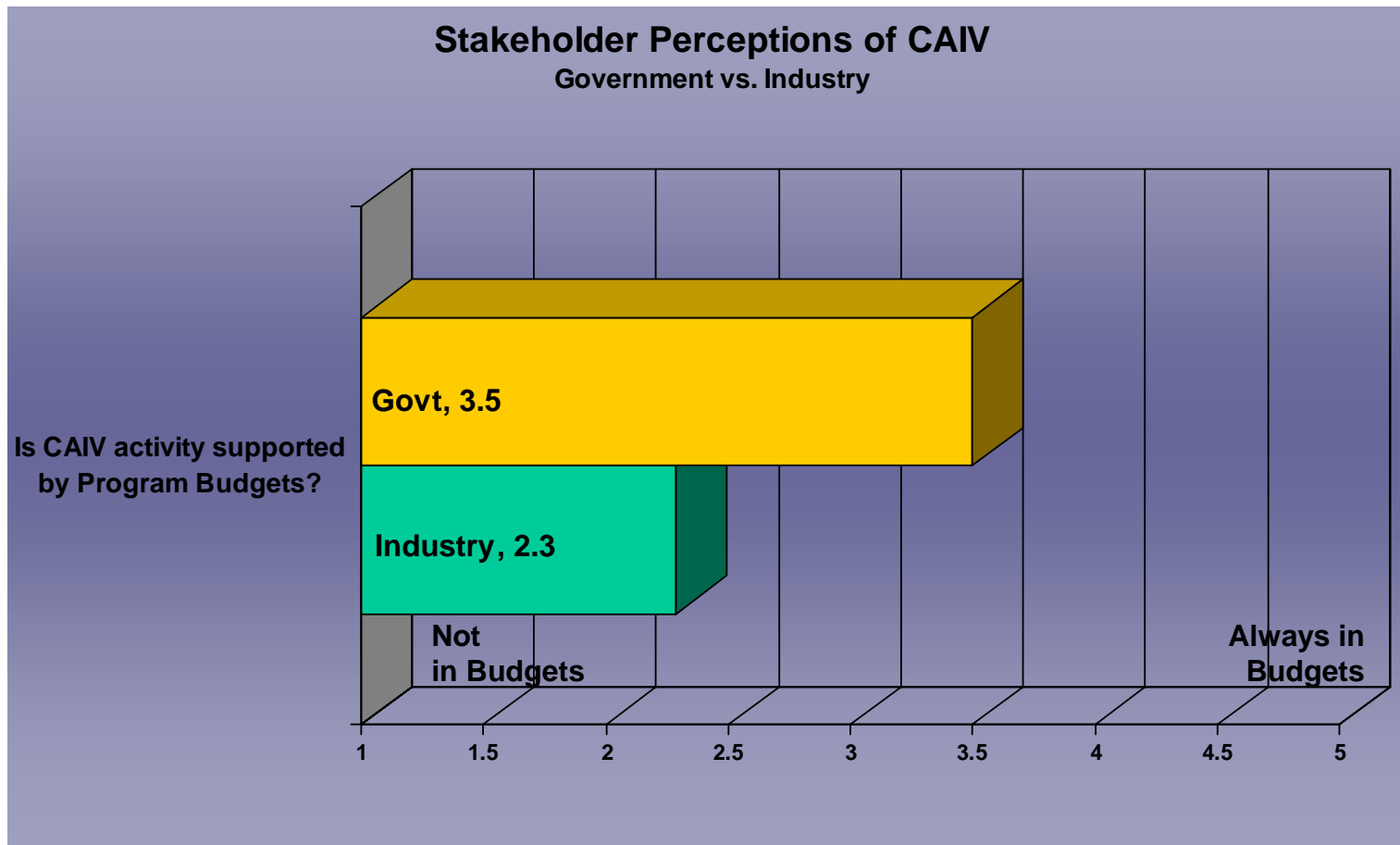
Most functions do not view of CAIV as standard work



CAIV Stakeholder Perceptions



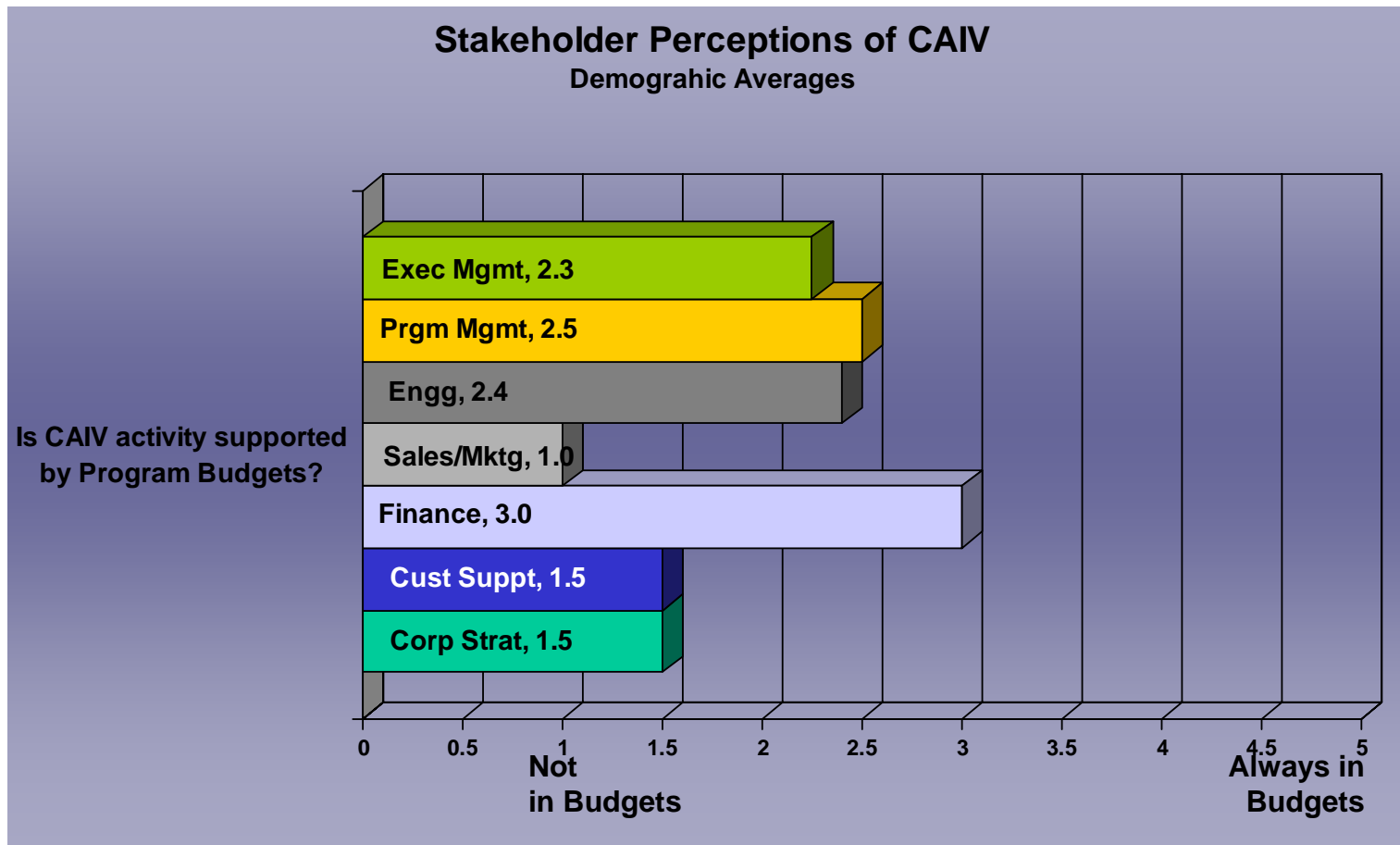
Industry stakeholders report that current programs generally **do not** include CAIV resources – while Government assumes that it usually **is**



CAIV Stakeholder Perceptions



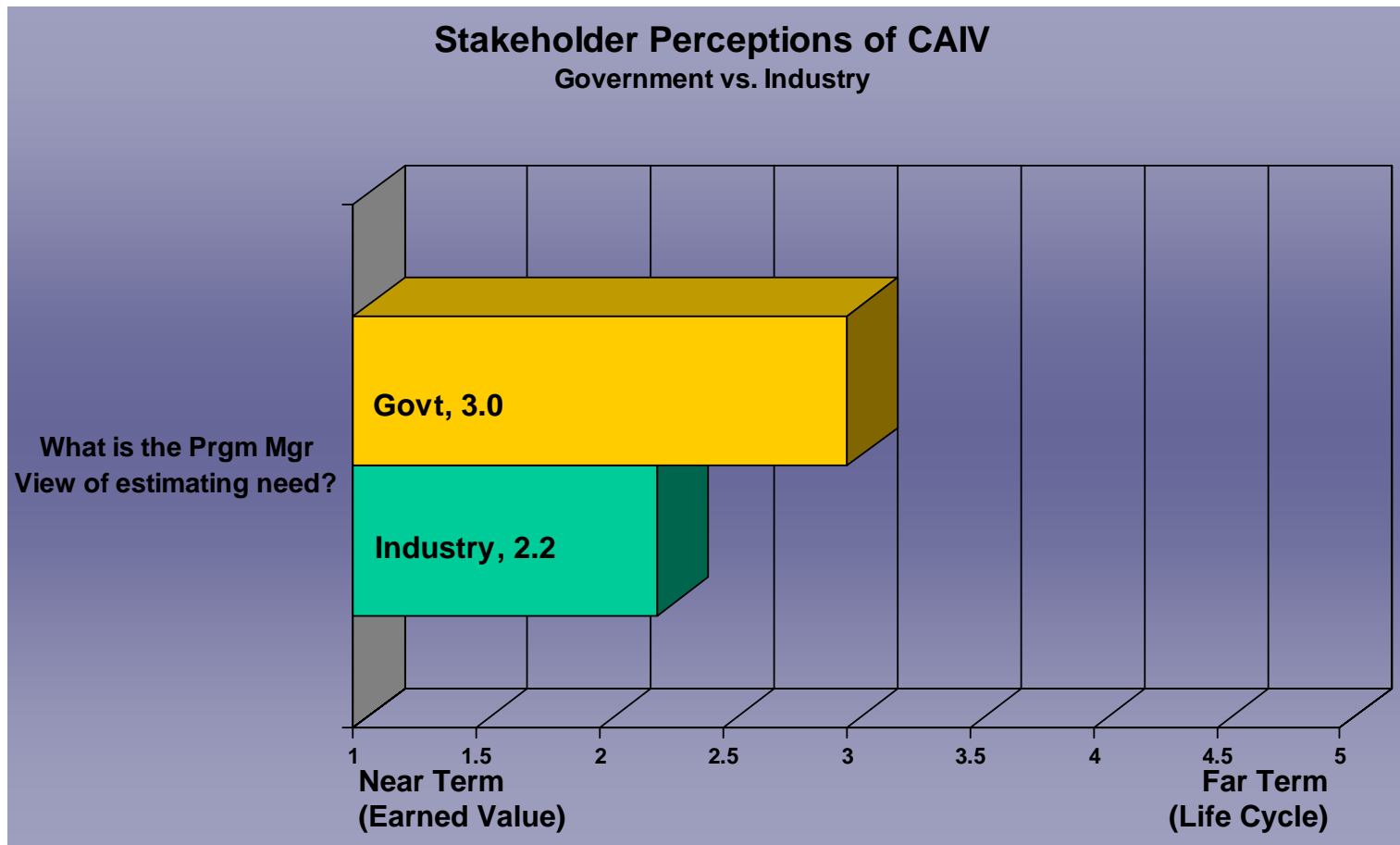
Nearly all functional groups believe that CAIV is not supported on most programs



CAIV Stakeholder Perceptions



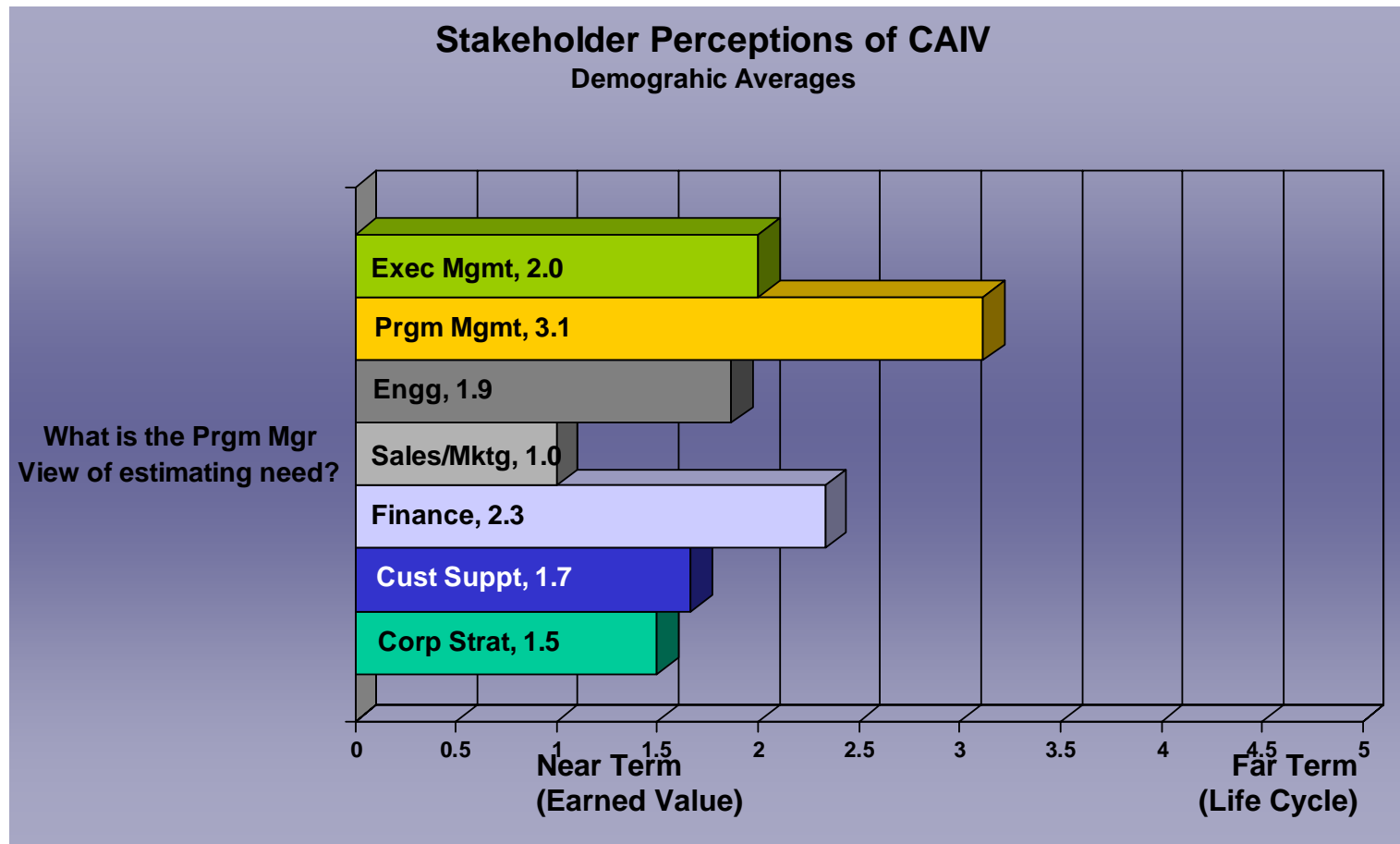
The data shows that Government managers believe they take a longer view of cost through the life cycle than industry



CAIV Stakeholder Perceptions

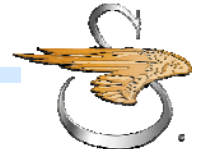


Data shows that functional Program Mgmt respondents believe they focus on Life Cycle Costs more than others view PM attention to LCC



CAIV Stakeholder Perceptions

Respondent Comments



Summary

- **Government Comments**

- CAIV is critical for controlling requirements and achieving best value - Without requirements control, CAIV is irrelevant.
- CAIV= An oversold under executed program. You told us one thing, it wasn't true and now we lie some more to get the money.

- **Industry Comments**

General

- CAIV is a fancy term for plain old cost effectiveness studies
- CAIV continues to require a "selling" job regarding its benefits for industry and customers
- CAIV it is best implemented as part of as a part of all design activities such as Weight Review Boards, Change Boards and Trade Studies
- CAIV was responsible for producing an RS-68 booster engine for half the development cost of any prior booster engine
- Managers should always be looking at both near and far term cost to ensure program success. Commercial customers do not really care about CAIV, but internally we should in their place.

CAIV Stakeholder Perceptions

Respondent Comments



Summary

- **Industry Comments (continued)**

Standard Work

- CAIV should be a standard process supported by both the customer and contractor – it is often implemented too late to impact downstream costs. Might be best suited for larger programs.
- While I believe CAIV is an important tool, the enterprise does not budget for the use of the tool nor is it standard work in the business development or proposal areas. Most in the enterprise only believe a bottoms up.
- It is always one of the first things to be cut during estimation and subsequent negotiations with the customer while more and more we are seeing the customer focus on LCC.

Understanding CAIV

- This survey is the first time I've heard of the acronym. Life Cycle Cost analysis is a familiar concept, and is integrated in to product business plans.
- I don't think CAIV/LCC is well understood by the Program team and how it influences our number 1 customer, the US Govt. We should be committing more time and resources to this effort up front to reap the benefits in the program execution phases.
- A "CAIV PRIMER" to IPT Leads and PM would add value at any time during a program but especially during a Risk-Reduction phase

CAIV Stakeholder Perceptions

Survey Summary



- Nearly all Government and Industry respondents believe that a well executed CAIV program has great value for overall program success
- There is a strong Government and Industry perception that programs tend to focus on early phase contract performance more than Life Cycle affordability
- CAIV support varies with program phase – the highest overall support for production and O&S costs analysis was during the SD&D phase
 - However, some respondents indicate it is almost too late to impact production and support costs once you enter the SD&D phase
- Industry stakeholder understanding of CAIV objectives, principles and tools appears to be limited while Government perception is that CAIV is well understood
- In strong contrast, Government respondents view CAIV as funded “Standard Work” while Industry view is that CAIV not standard and inadequately funded
- Overall accuracy of CAIV estimates is questioned by most managers – especially government (need to understand why)
- Executive managers value early application of CAIV to help ensure an affordable program more than other decision makers in Finance, Engineering and Sales/Marketing

CAIV Stakeholder Perceptions



Conclusions

- Nearly all government and industry respondents believe that a well executed CAIV program is a highly effective key to program success
- Government managers expect CAIV to be conducted as standard work on most programs – as opposed to most industry managers
- The focus of industry managers on near term contract deliverables often leads to limited CAIV activity early in program, when it is most effective
- CAIV is not well supported by government or internal budgets
- Preponderance for initial CAIV application during SD&D is too late for significant impact on production and support costs – the longer view is often overlooked
- There remains overall stakeholder skepticism for the accuracy of CAIV estimates
 - Government has low confidence in CAIV estimating accuracy
 - Low investment in cost methodology and robust application may lead to increased estimate skepticism
 - Skepticism leads to limited budget
 - The basis for low confidence in estimating accuracy must be determined and addressed

CAIV Stakeholder Perceptions



Next Steps

- A wider survey base is needed to obtain better information on demographic perceptions that can focus education and mitigation efforts
 - Survey reflects only two aircraft and space companies
 - Need more data from including avionics, ship, ground, other government agencies and other stakeholders in the acquisition process
- Government and Industry must invest in developing and maintaining tools and methods to gain stakeholder acceptance
 - Industry needs better data collections and support for parametric calibrations to overcome government “accuracy” concern
 - A “certification” process that validates an organization or personnel estimating capabilities (both traditional and parametric) may help overcome skepticism
 - Develop better focused education materials for key demographics
 - Government agencies need to be familiar with and accepting of parametric tools that drive CAIV analysis
- Industry needs to consider CAIV as “Standard Work” that is supported by government customer
- Finance, Pricing, Program Management and other teams need specific examples of CAIV benefits to them
 - The cost community must create a solid business case and present it to mid and upper level functional managers

CAIV Stakeholder Perceptions



BACKUP

Cost As an Independent Variable (CAIV)

Stakeholder Perceptions



All Respondent Comments

- **Government**

- CAIV is critical to requirements control. Requirements control tied to actual and expected future mission need is critical to cost control and identifying best value proposals. Without requirements control, CAIV is irrelevant.
- CAIV= An oversold under executed program. You told us one thing, it wasn't true and now we lie some more to get the money.
- CAIV/LCC is critical to achieving full program reqts

Cost As an Independent Variable (CAIV)

Stakeholder Perceptions



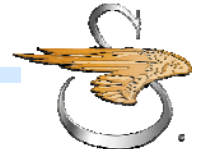
All Respondent Comments

- **Industry**

- This survey is the first time I've heard of the acronym. Life Cycle Cost analysis is a familiar concept, and is integrated in to product business plans.
- For my Program, CAIV/LCC was a contract deliverable and the government team provided guidelines with which to develop estimates.
- CAIV is a fancy term for plain old cost effectiveness studies. Cost is always a program design parameter to be traded against performance, schedule, and risk.
- CAIV should be a standard process supported by both the customer and contractor. Programs often look to control "downstream" costs when it is too late to impact.
- The CAIV is an important tool for the enterprise to utilize. I find that the enterprise does not budget for the use of the tool nor is it standard work in the business development or proposal areas. Most in the enterprise only believe a bottoms up.

Cost As an Independent Variable (CAIV)

Stakeholder Perceptions



Respondent Comments

- **Industry (continued)**

- "Type of product may drive some of the resource assessment. Many of our products are expendable (rocket engines that are discarded after launch), and as a result, the O&S part of the LCC may be (but not always) small compared to SDD and Production.
- In this survey, I have assumed that CAIV includes cost risk analysis more robustly than in the past.
- The perception of CAIV estimating accuracy is likely to vary by phase as well.
- CAIV may be considered ""standard work"" or standard practice more for larger programs, than smaller (<\$10M) programs."
- Managers should always be looking at both near and far term cost to ensure program success. Commercial customers do not really care about CAIV, but internally we should in their place.

Cost As an Independent Variable (CAIV)

Stakeholder Perceptions



Respondent Comments

- **Industry (continued)**

- many proposals, Boeing best practice assessments, project leadership,
- Seen during proposal activities for VXX and CSAR-X
- CAIV works only with total management and customer commitment.
- I don't think CAIV/LCC is well understood by the Program team and how it influences our number 1 customer, the US Govt. We should be committing more time and resources to this effort up front to reap the benefits in the program execution phases.
- Continues to require a "selling" job regarding its benefits at Sikorsky and with customers.

Cost As an Independent Variable (CAIV)

Stakeholder Perceptions



Respondent Comments

- **Industry (continued)**
 - CAIV can drive high technology programs to low cost, but also low reliability. The balance between the product requirements and cost of meeting the requirements is critical to a successful program.
 - It is always one of the first things to be cut during estimation and subsequent negotiations with the customer. More and More we are seeing the customer focus on LCC. It is important that we make CAIV standard work and assure it is within our IMP/IMS to extent possible and we have standard BOEs based upon contract complexity and size to assure CAIV is supported by all involved groups.
 - CAIV relative to the Black Hawk and Comanche Programs experience.
 - CAIV/LCC analysis was a critical element in decision-making on RS-68. I still think however that there is a general lack of understanding by PM's of what CAIV/LCC analysis is and how to use it in planning and executing programs

Cost As an Independent Variable (CAIV)

Stakeholder Perceptions



Respondent Comments

- **Industry (continued)**

- I believe that CAIV is essential. I think that CAIV needs to be considered as a part of all design decision making and change management activities. As such, I believe it is best implemented as part of other program integration activities such as Weight Review Boards, Change Boards and Trade Study activities by ensuring that NRE, Recurring and downstream support costs are evaluated as a part of all design decisions, trade studies and change board activities.
- CAIV was responsible for producing an RS-68 booster engine for half the development cost of any prior booster engine
- CAIV/LCC is extremely valuable but is little understood by our PM and IPT community. A "CAIV PRIMER" to IPT Leads and PM would add value at any time during a program but especially during a Risk-Reduction phase.

Cost As an Independent Variable (CAIV)

Stakeholder Perceptions – Averages, Variance & Count



	Entire Survey Average					Count
	Average	Max	Min	Var	N/A	
Question 1: You are in the Concept Definition & Refinement phase. How much would you spend to estimate the cost for the following phases?						
Question 1: Technology Development	3.815	5	2	0.997	5	70
Question 1: System Design & Development	3.969	5	1	0.968	5	70
Question 1: Production	3.484	5	1	1.143	5	69
Question 1: Operating & Support	3.328	5	1	1.462	6	70
Question 2: You have now progressed to the Technology Development phase. How much would you spend to estimate the cost for the following phases?						
Question 2: System Design & Development	4.015	5	2	0.797	5	70
Question 2: Production	3.797	5	2	0.958	5	70
Question 2: Operating & Support	3.547	5	1	0.950	5	70
Question 3: You have now progressed to the System Design & Development (SD&D) phase. How much would you spend to estimate the cost for the following phases?						
Question 3: Production	4.031	5	2	0.888	6	70
Question 3: Operating & Support	3.831	5	1	0.893	5	70
Question 4: You are in the Concept phase. How important is CAIV analyses to phase success in the following phases?						
Question 4: Technology Development	3.754	5	2	0.907	5	70
Question 4: System Design & Development	4.031	5	1	0.874	5	70
Question 4: Production	3.781	5	1	0.999	6	70
Question 4: Operating & Support	3.625	5	1	1.095	6	70
Question 5: You are in the Technology Development phase. How important is CAIV analyses to phase success in the following phases?						
Question 5: System Design & Development	4.046	5	2	0.920	5	70
Question 5: Production	3.846	5	1	0.851	5	70
Question 5: Operating & Support	3.641	5	1	0.901	5	69
Question 6: You are in the System Design & Development (SD&D) phase. How important is CAIV analyses to phase success in the following phases?						
Question 6: Production	4.090	5	2	0.810	5	70
Question 6: Operating & Support	4.000	5	2	0.818	3	70
Question 7: Do program stakeholders understand CAIV methods, tools & processes?	2.700	5	1	0.976	2	70
Question 8: How effective is a well executed CAIV effort in helping to reduce program cost?	4.015	5	1	0.890	4	69
Question 9: What level of confidence do you have in CAIV estimating?	3.369	5	1	1.112	4	69
Question 10: Do current program budgets fully support CAIV initiatives?	2.463	6	1	1.616	2	69
Question 11: Do customers generally support CAIV expense to the program?	2.925	6	1	0.706	3	70
Question 12: What time frame is Program Management's focus for cost reduction?	2.343	5	1	1.620	0	70
Question 13: Is CAIV considered 'Standard Work' for the Proposal/Procurement process?	2.484	6	1	1.905	6	70