

MBSE Industry Research: Value Positioning & Readiness for Success 2025 Market & Industry Forum—10 April 2025

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**MBSE Industry Research: Value Positioning & Readiness for Success
PLM Market & Industry Forum**
A CIMdata PLM Leadership Event

10 April 2025—Frankfurt, GERMANY

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Researchers' Profiles



Sandeepak Natu, Co-Director, Simulation-Driven Systems Development Practice

Over 25 years of experience in engineering simulation, consulting, solution selling, and business development. Gained his initial professional experience with Fluent India as part of technical support and services teams with focus on academic support and process industry. Helped numerous multinational companies establish their initial computational modeling teams in India.



James Roche, Executive Consultant, A&D Practice Director

Over 35 years of experience in transformation and IT enablement of product development and manufacturing processes. PLM Practice Manager at CSC Consulting and at A.T. Kearney, where he led development and delivery of PLM services for international clients in the aero, auto, consumer products, high-tech, and medical device industries. Previously with EDS, he served as chief architect for General Motors' worldwide engineering systems.

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Researchers' Profiles



Don Tolle, Co-Director, Simulation-Driven Systems Development Practice

Over 40 years of experience in engineering design, simulation and test domains, including software product development, MBx implementation consulting, go to market strategy development and strategic partnering/M&A. Broad scope of senior positions with PLM/CAE/Test software & engineering services providers. 13+ years with CIMdata leading up the S&A and SDSD Consulting Practices.

Participant in industry working groups – INCOSE, NAFEMS, and A&D PLM Action Group.


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Key Takeaways

 *MBSE Industry Research – Report of Findings (1 of 2)*


- There is broad agreement across industry and within the solution provider community that MBSE has risen dramatically in perceived value and importance over the last three to five years
- The methodology of MBSE is in early days – some experts draw a comparison with CAD in the 1990's
- There is strong alignment of industry and solution providers on many aspects of MBSE's value, current state, future trends and criteria for success – but there are significant differences as well

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Key Takeaways


 *MBSE Industry Research – Report of Findings (2 of 2)*

- The most significant disconnect is regarding interoperability and openness – the need to share MBSE models and data in a straightforward way within an engineering organization and between multiple enterprises who need to collaborate based on MBSE models and digital data instead of documents
 - For industry, this is the number one priority
 - For the solution provider community, this is not a priority

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Agenda

- Introduction
- Research Findings
 - Value Positioning
 - Value Footprint Over Time
 - Readiness Assessment
- Questions & Answers

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Aerospace & Defense PLM Action Group

 *The Aerospace & Defense PLM Action Group was founded in February 2014*

Mission

An association of aerospace & defense companies within CIMdata’s globally recognized PLM Community Program, which functions as a **PLM advocacy group** to:

- Set the direction for the aerospace & defense industry on PLM-related topics that matter to members
- Promote common industry PLM processes and practices
- Define requirements for common interest PLM-related capabilities
- Communicate with a unified voice to PLM solution providers
- Sponsor collaborative PLM research on member-prioritized industry and technology topics

Website: www.ad-pag.com

Members

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Collaborative Research Program



Study Model-Based Systems Engineering (MBSE) current state and future trends

Sponsors








SIEMENS

Objective


The A&D PLM Action Group members and the PLM solution provider sponsors shared a common objective for this research –

To gain understanding of needs and opportunities within industry that will inform MBSE solution strategy and roadmap and implementation planning

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Information Gathering



Subject matter expert interviews & an online survey of committed professionals

Interviews

- A total of 18 in-depth interviews were conducted by CIMdata with five communities:
 - 4 PLM solution provider sponsors
 - 4 other “providers of interest”
 - 2 solution provider sponsor key customers
 - 6 AD PAG member companies
 - 2 renowned experts from academia
- The 8 A&D companies interviewed included
 - 6 of the Top 20
 - 4 of the Top 10
- Learnings from the interviews guided the line of inquiry in the web-based survey


Survey

- A total of 82 complete and validated online survey responses were received and analyzed
- The survey was intentionally designed to be a challenge for the respondent
 - Answering the questions required a deep understanding of the status and plans for MBSE realization within the respondent’s company
 - The average time to complete the survey was approximately 30 minutes
- This strategy achieved the desired effect
 - Only experts on the topic of MBSE invested the time and effort needed to complete the survey


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Analysis & Reporting



Compares and contrasts perspectives of industrial users and solution providers


Analysis

- In addition to 4 sponsors, 4 “Providers of Interest” participated: Dassault Systemes, HCLTech, IBM and TCS
- In depth interviews with experts from 8 industrial user companies and 8 solution providers provided a statistically significant sample size
- Analysis of interviews compared perspectives of industrial users and solution providers
- Analysis of survey responses validated and augmented results from industry interviews


Reporting

- Industry Survey Report – responses to each survey question are summarized and presented in charts or graphs [Created for respondents to the web-based survey]
- Report of Findings – Expansion of the Industry Survey Report to include interview responses and CIMdata’s analysis [Generally available]
- Final Report – Expansion of the Report of Findings to include assessments of the findings by the AD PAG members and the solution provider sponsors [Available to sponsors only]

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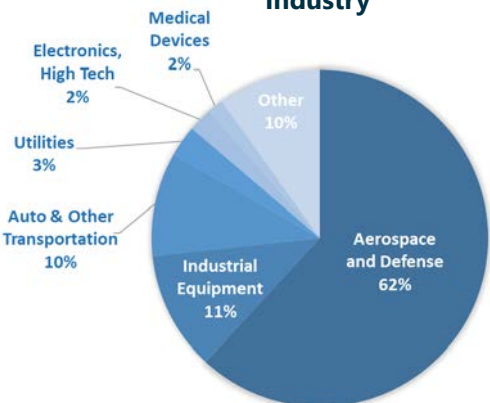


Survey Respondent Demographics



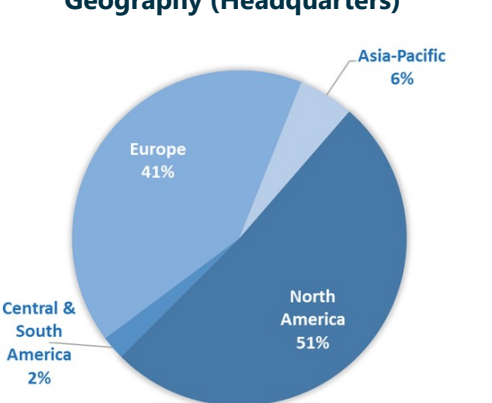
Heavily aerospace & defense with global representation

Industry



Industry	Percentage
Aerospace and Defense	62%
Industrial Equipment	11%
Auto & Other Transportation	10%
Other	10%
Utilities	3%
Electronics, High Tech	2%
Medical Devices	2%

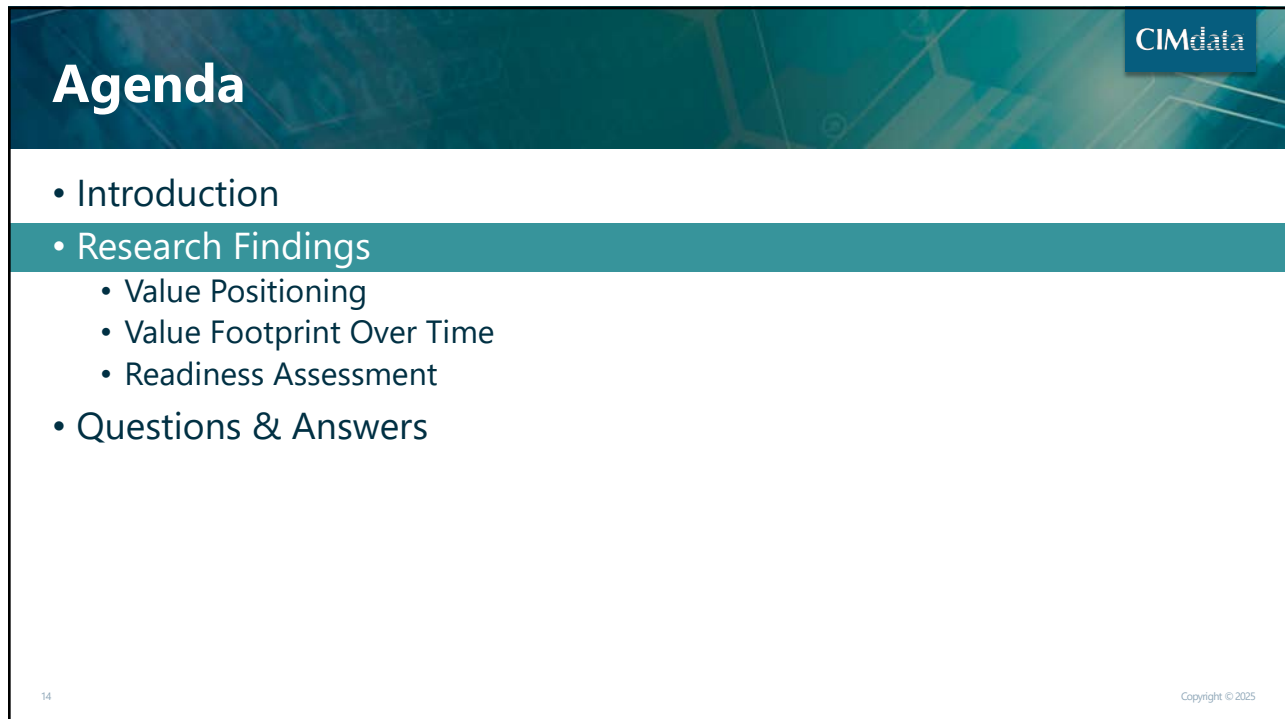
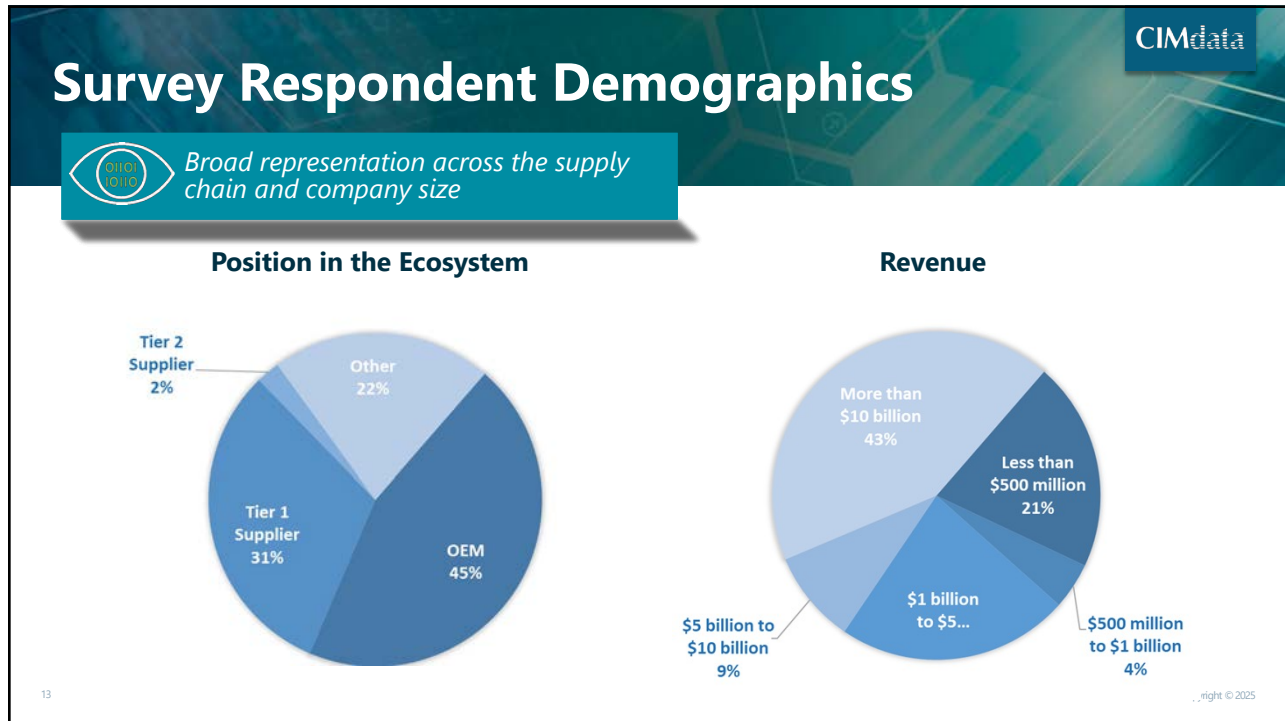
Geography (Headquarters)



Geography	Percentage
North America	51%
Europe	41%
Asia-Pacific	6%
Central & South America	2%



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Value Positioning



Definition of Model-Based Systems Engineering (MBSE)

Perspectives of Note

"MBSE without simulation and analysis is meaningless. It is a key part of MBSE that communicates design intent, through a reference model."


"Model-based itself is fundamental to digital engineering. The key is moving from document-centric to model-centric, and this applies to manufacturing as well as engineering."

"Software design and ALM is done separately from systems engineering and MBSE."

"INCOSE is a bit too vague. More specifically the M is of the functional dimension. The geometrical dimension is well mastered in CAD and geometry-based analyses. Of course, the two views are highly interrelated."*

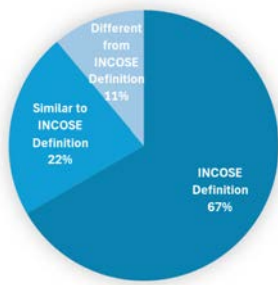
* - This statement draws a distinction between functional modeling, i.e., MBSE and geometric modeling, i.e., CAD
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Industry





(% of interviewees)


Solution Providers



(% of interviewees)

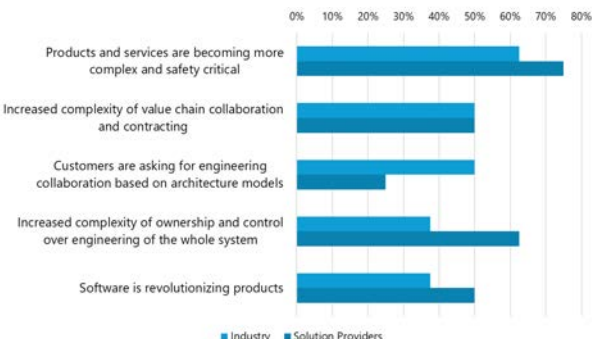



Value Positioning



Changes that have elevated perception of value and investment in MBSE (1 of 4)

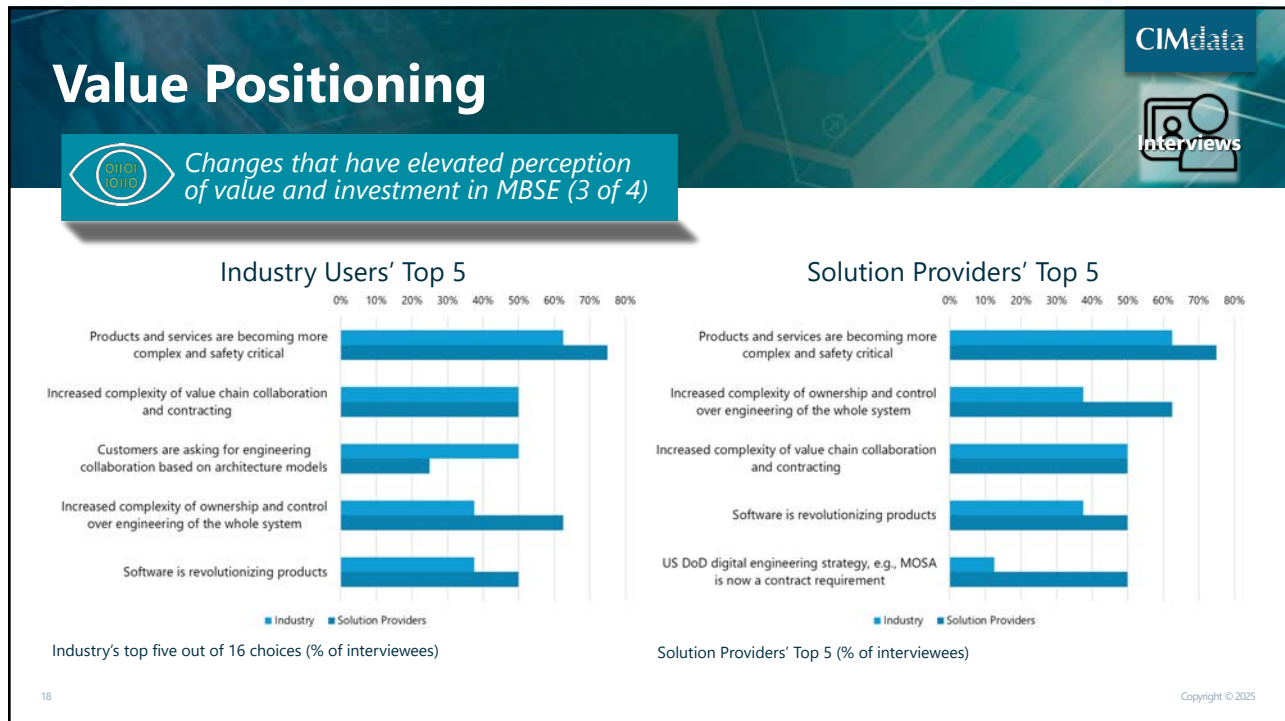
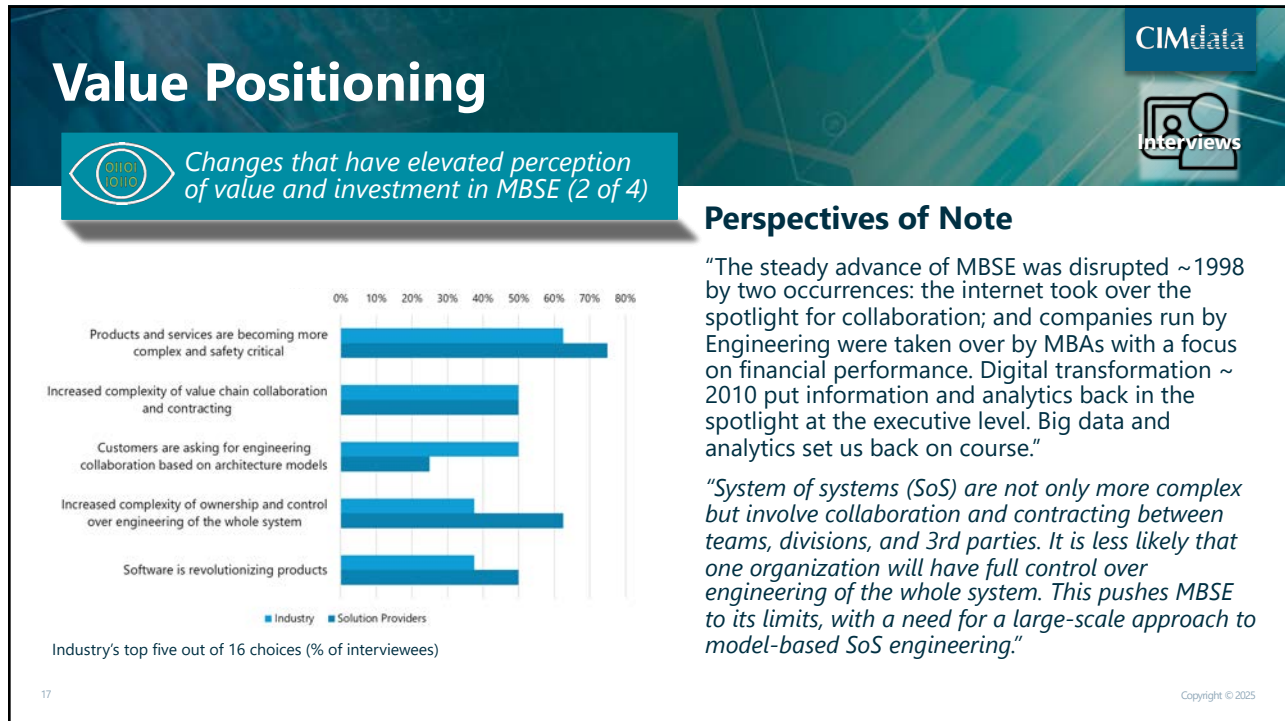
- Increase in perception of value is due to three factors
 - Increased complexity in the products
 - Increase in software content
 - Emphasis on digital transformation
- US defense industry is impacted by DoD's digital engineering strategy, but others do not feel the impact as much
 - They do acknowledge that it is raising important conversations
- SysML v2 didn't figure prominently in the factors affecting increased perception of value
 - Industry and solution providers acknowledge it as a key enabler, but it is too early in the standard's lifecycle to assess its business impact on the A&D community



Industry's top five out of 16 choices (% of interviewees)

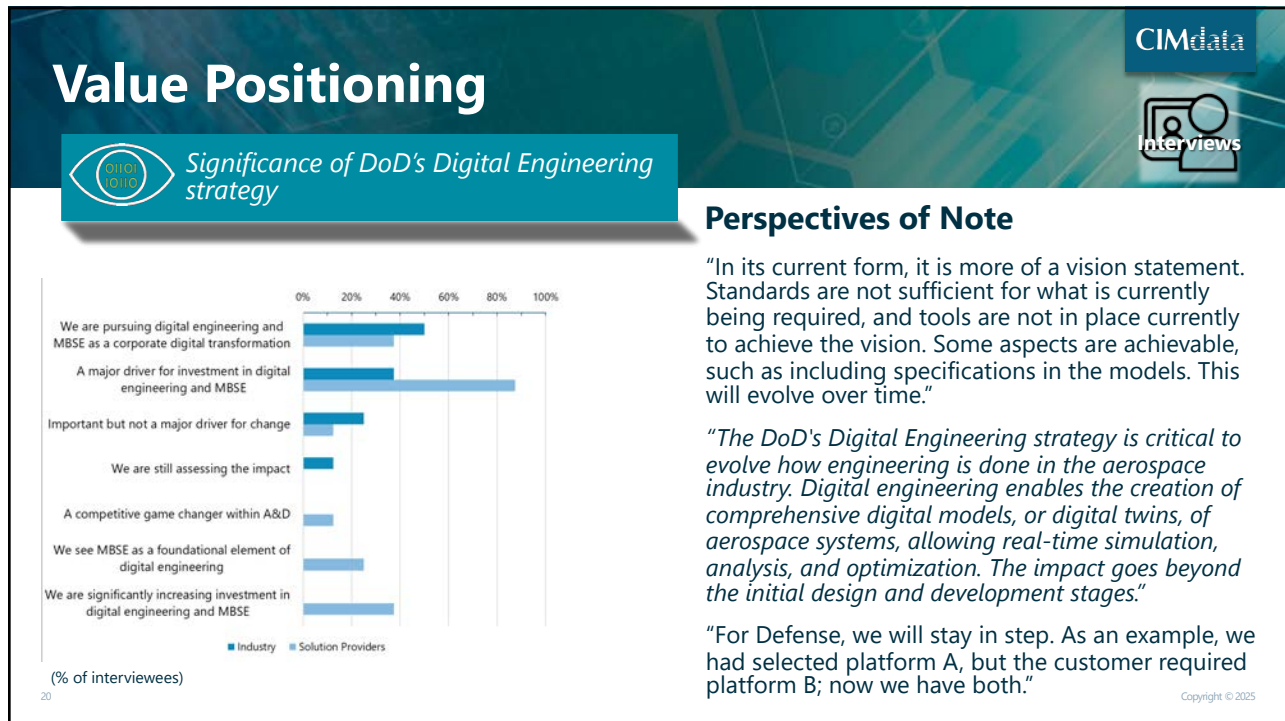
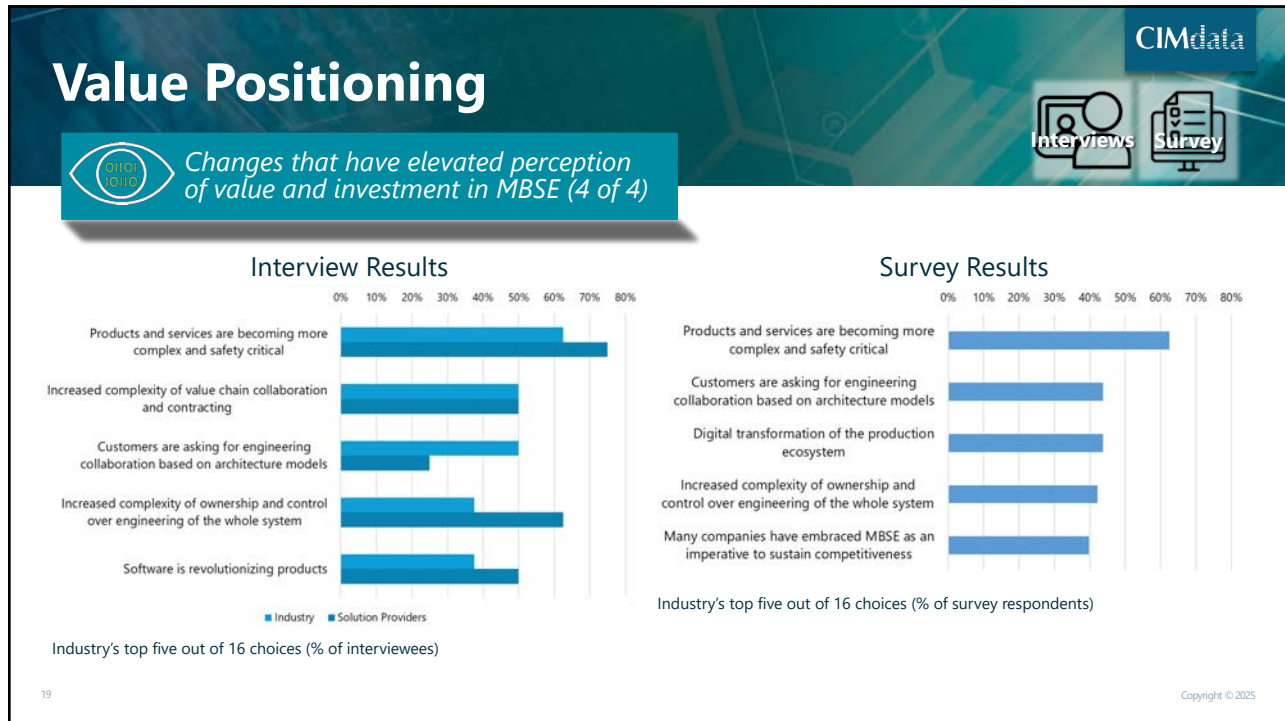
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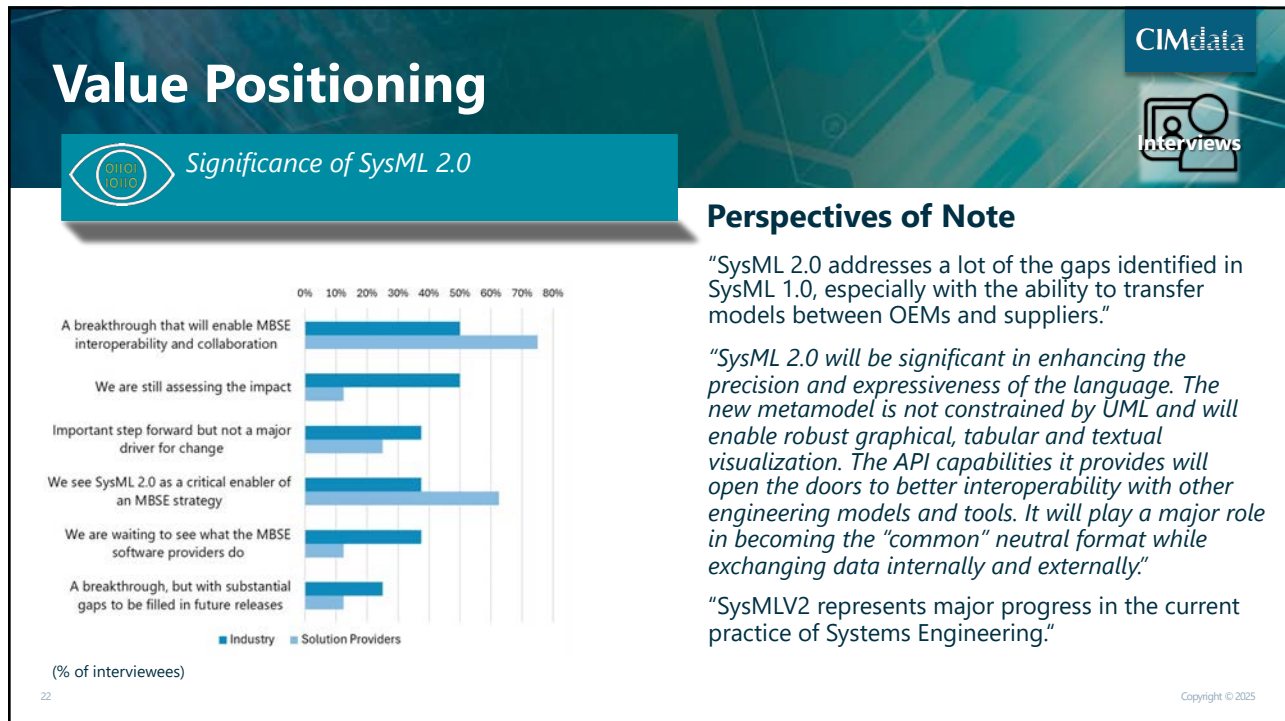
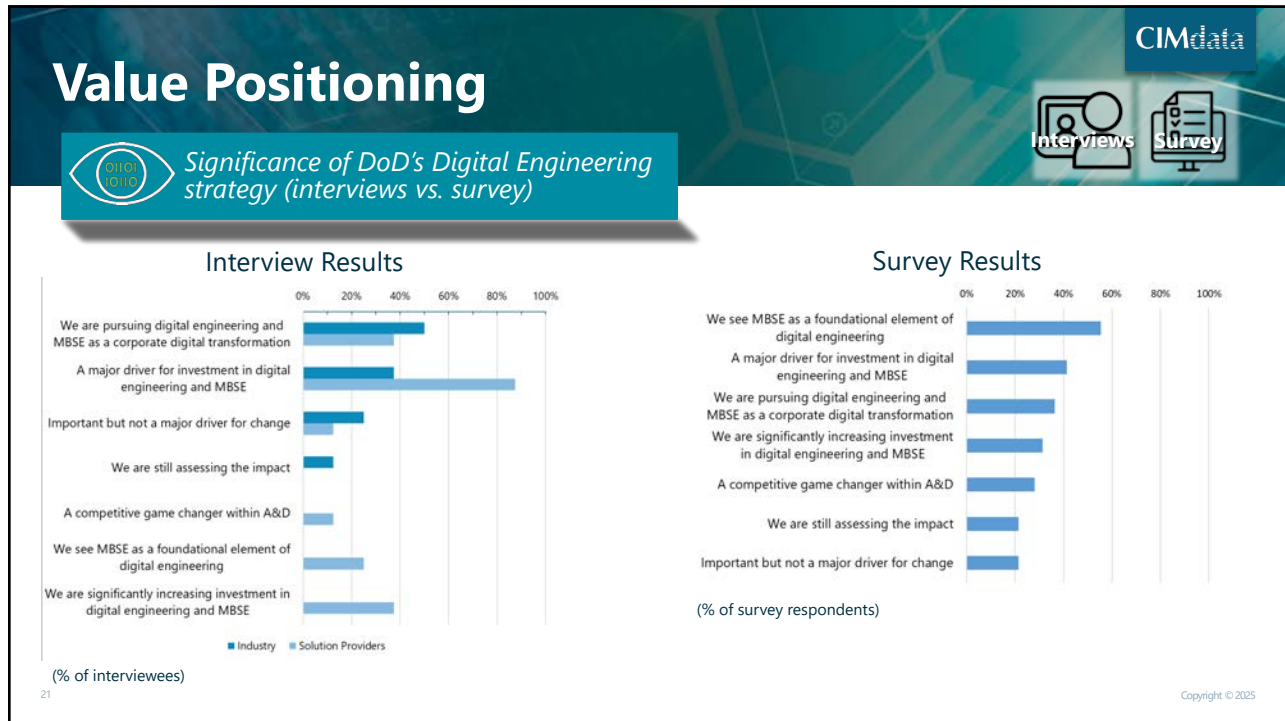
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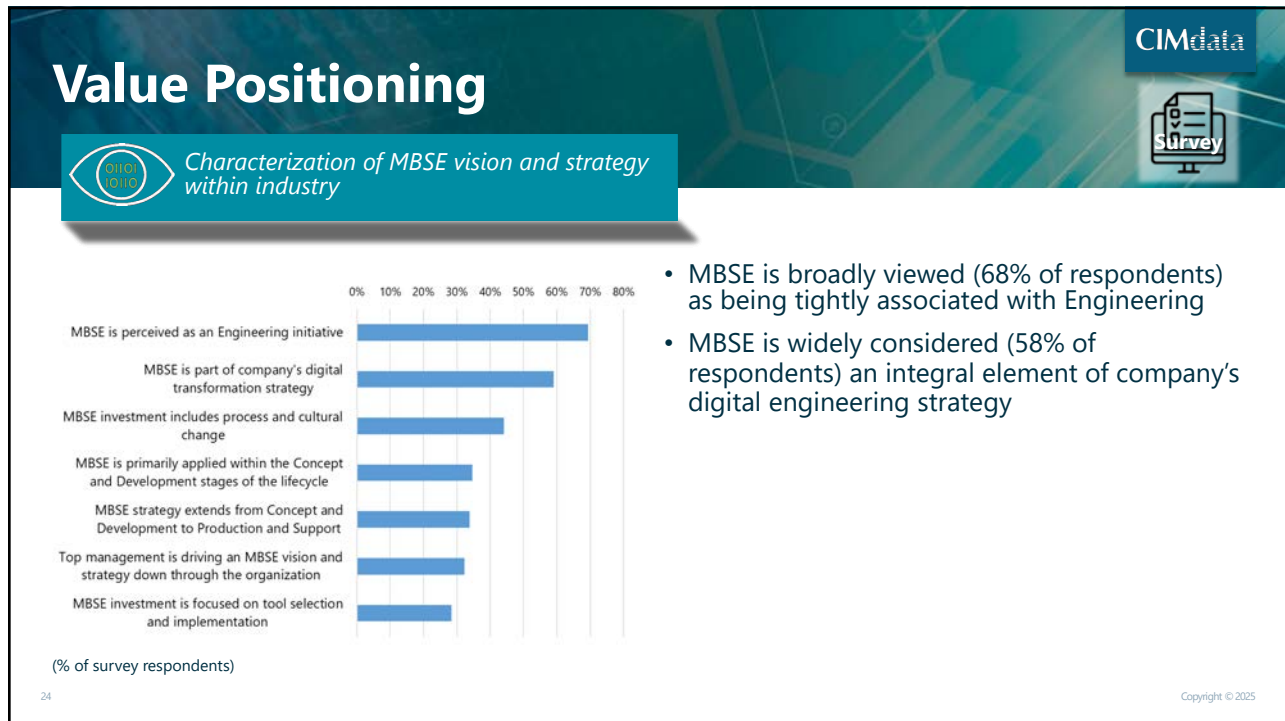
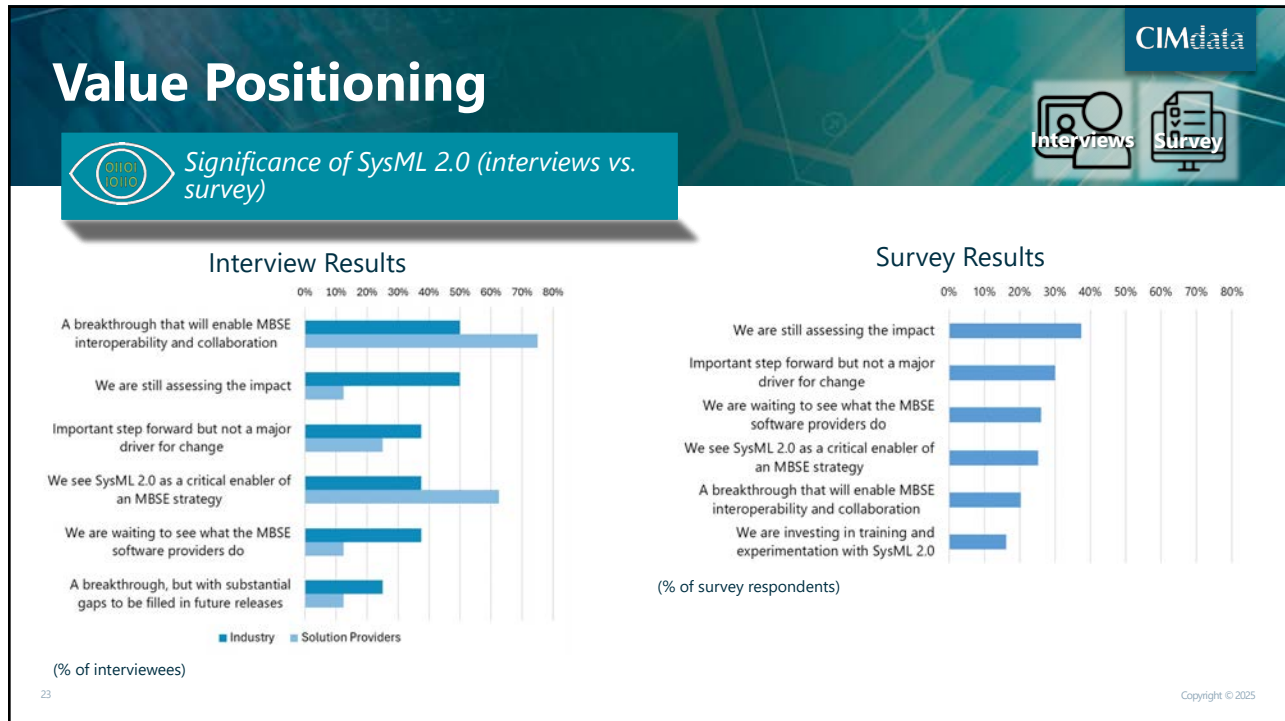
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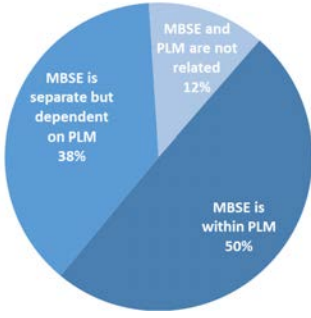
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Value Positioning




Relationship between MBSE and PLM




(% of survey respondents)

- A strong majority (88%) of the respondents see MBSE as strongly related to - either dependent or within - PLM
- A significant minority (12%) see MBSE and PLM as unrelated

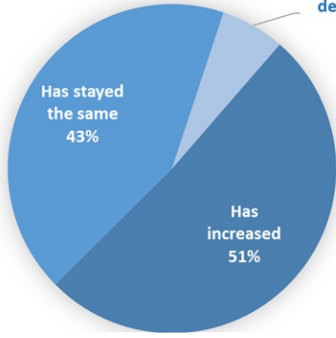
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Value Positioning

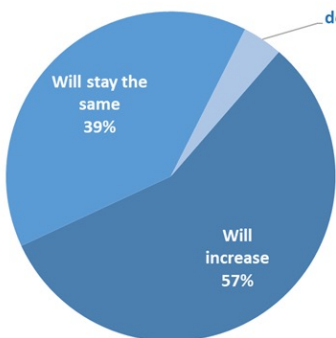

MBSE budget trend over past two years and over next two years

Previous Budget Trend



(% of survey respondents)

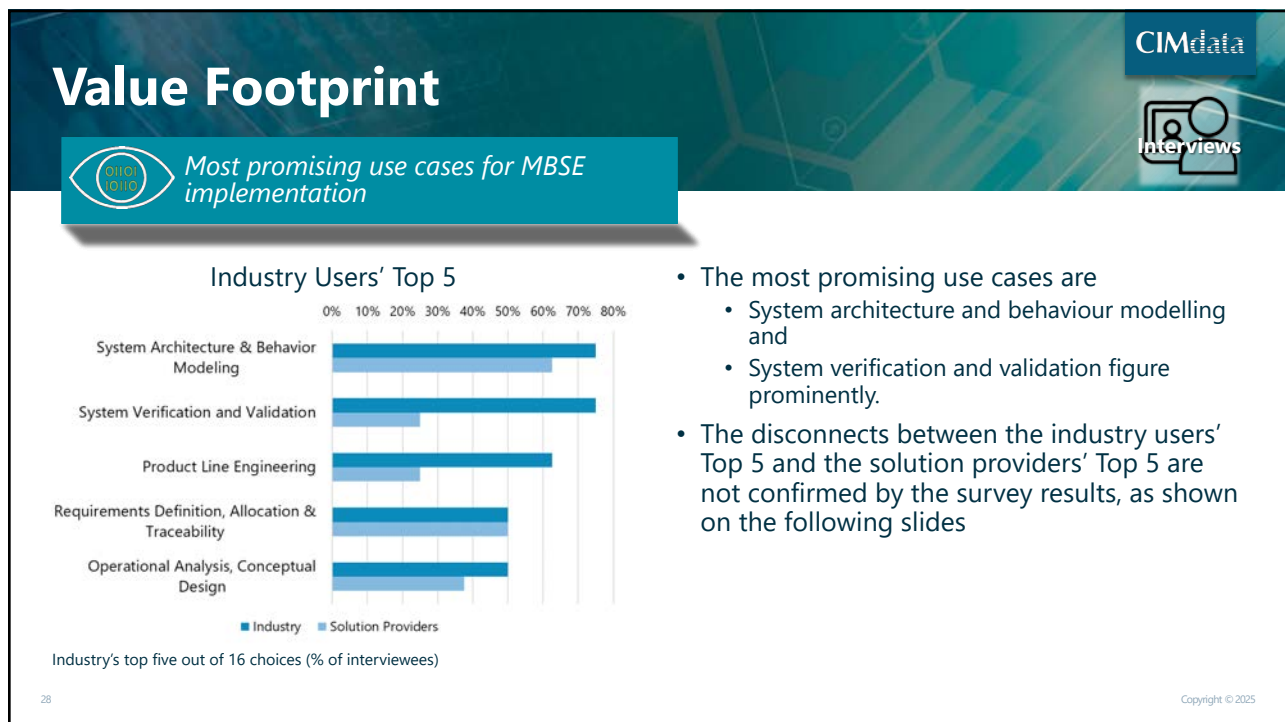
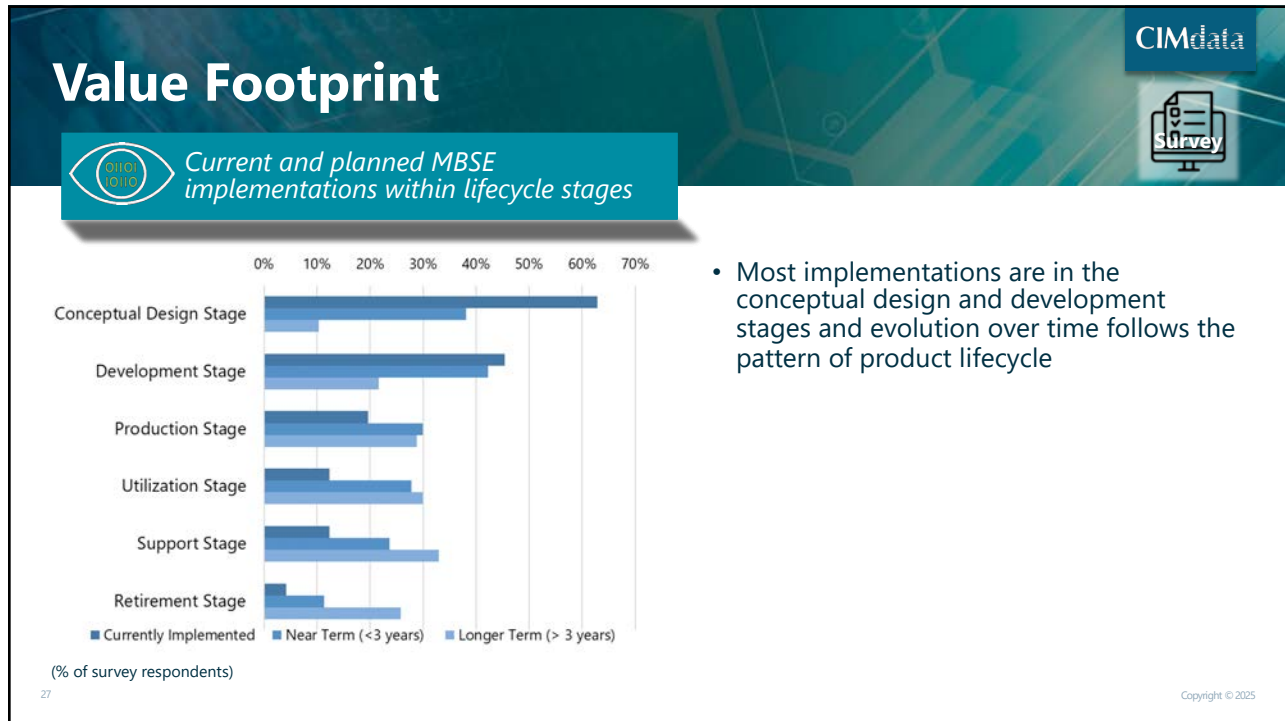
Future Budget Trend



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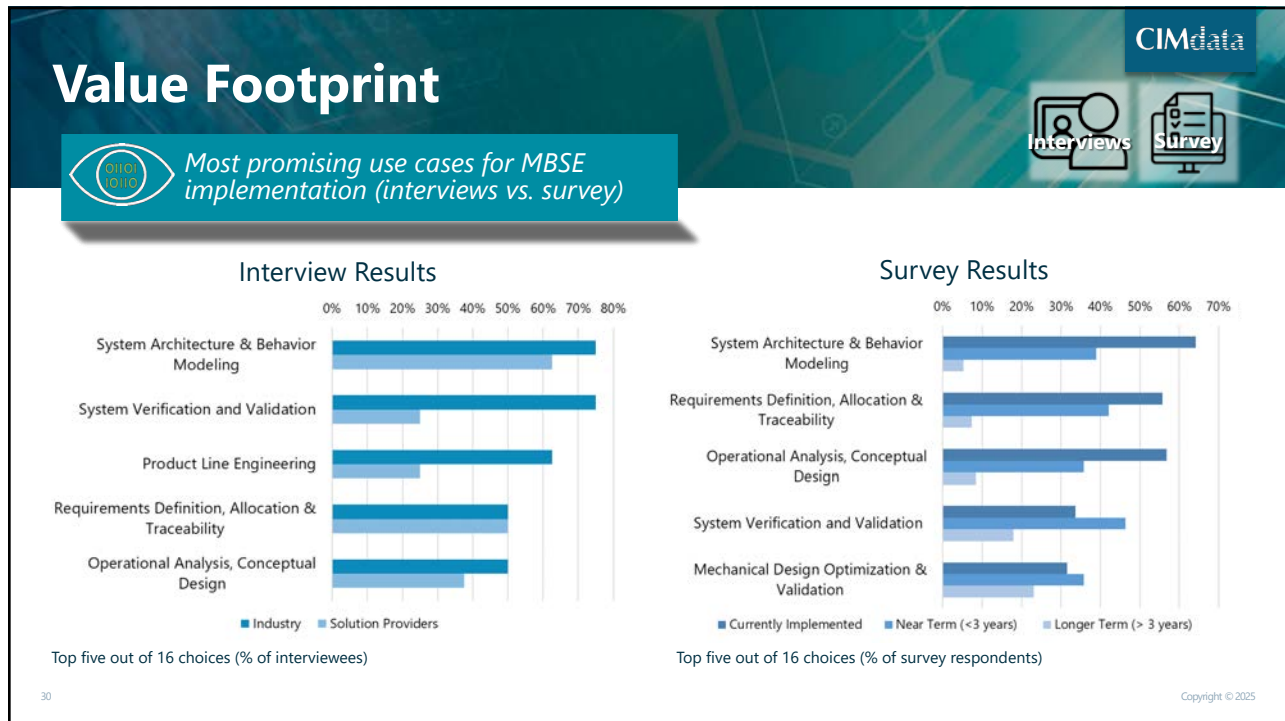
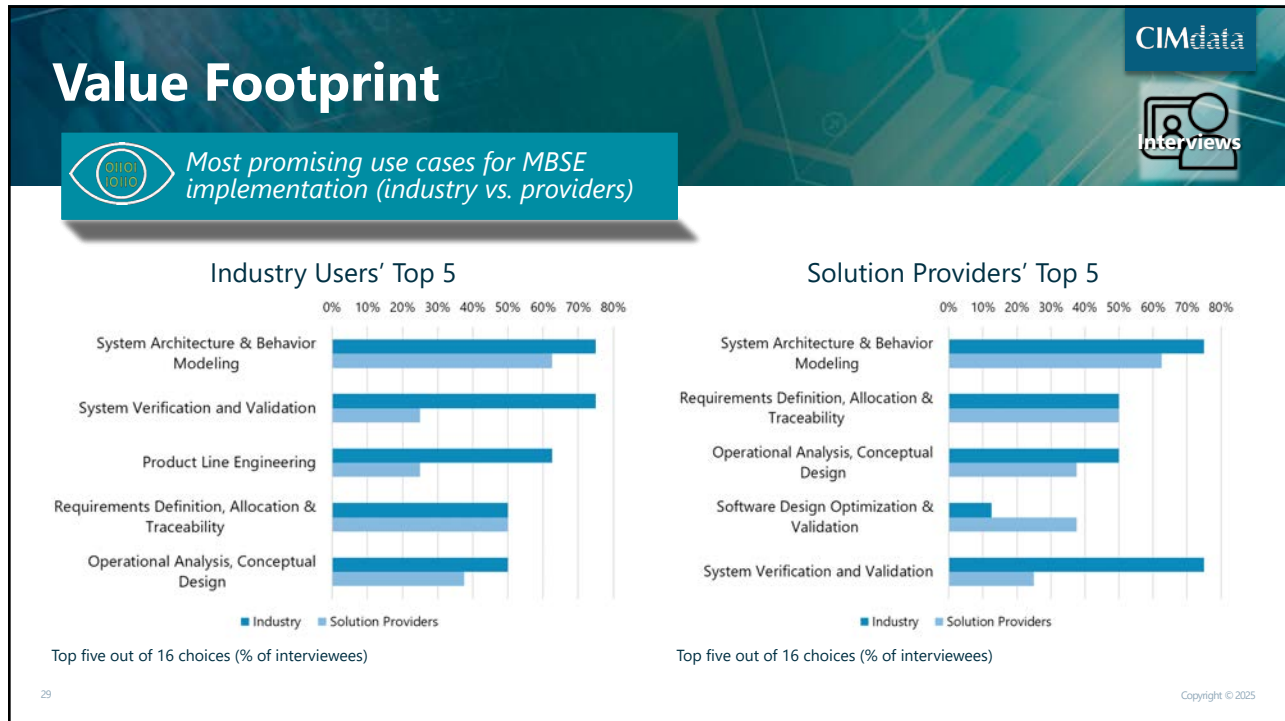
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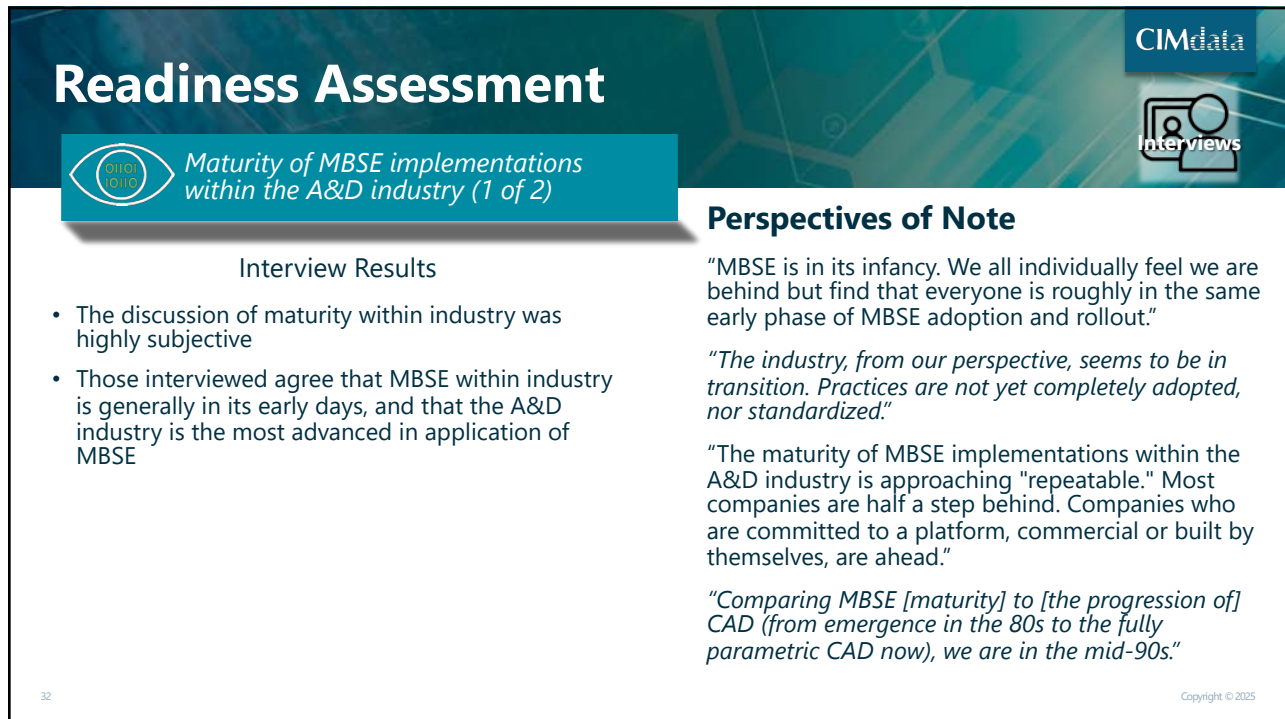
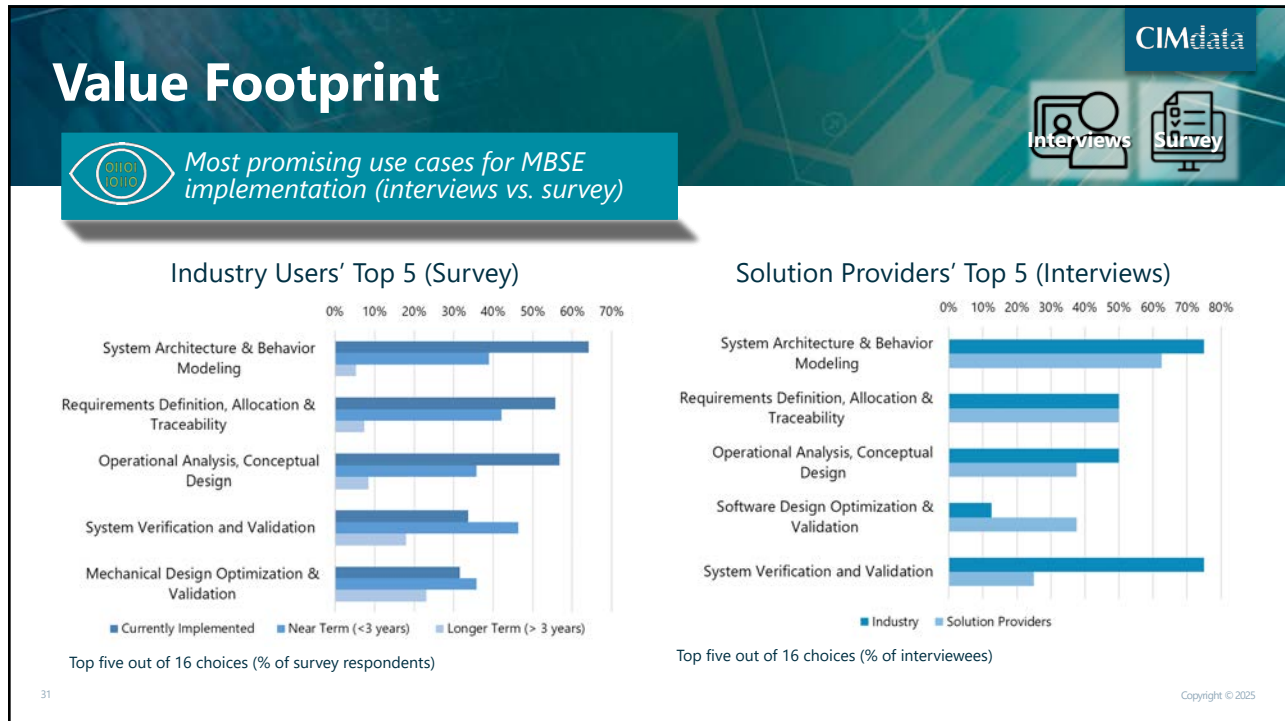
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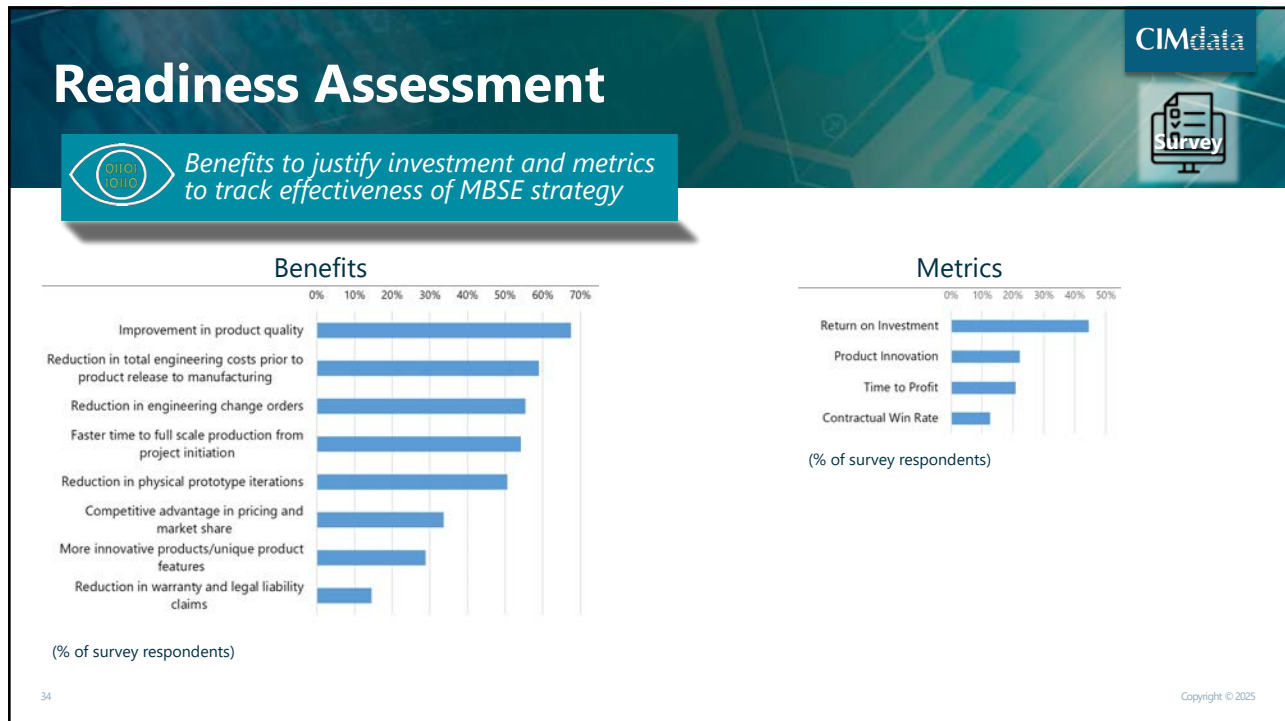
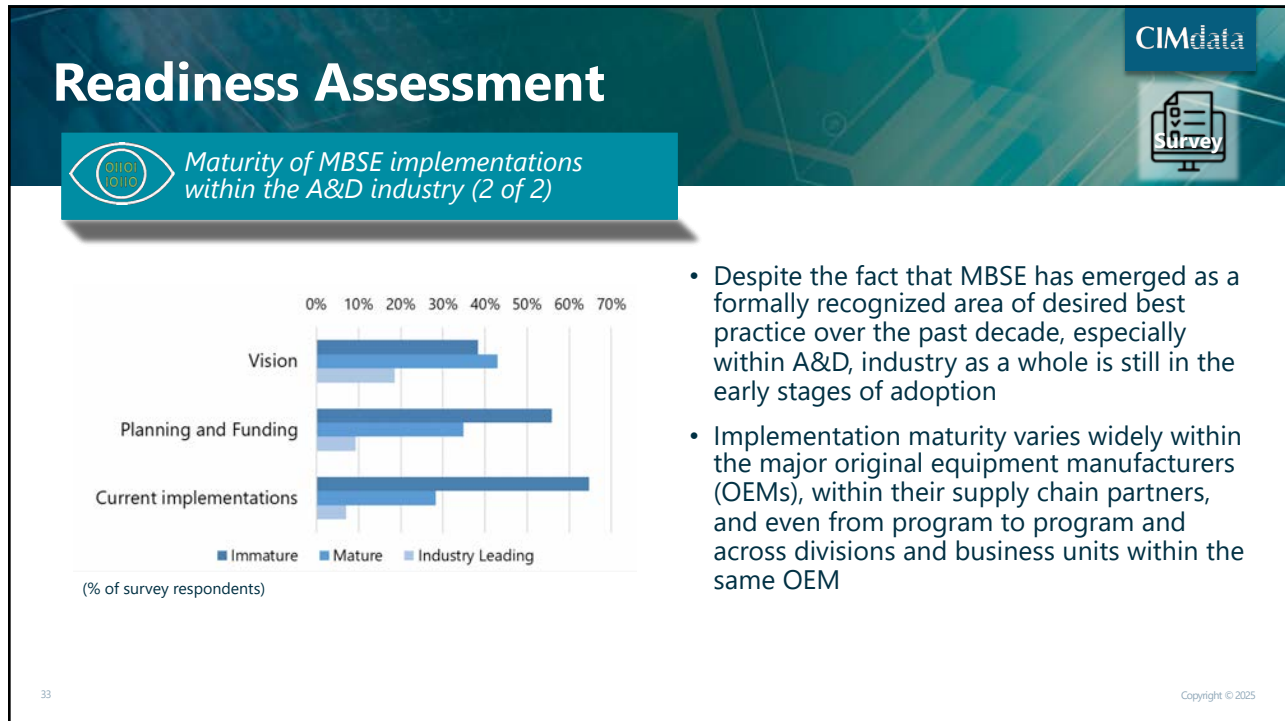
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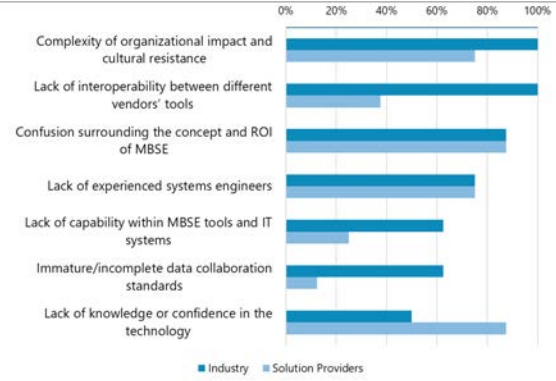
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Readiness Assessment



Principal inhibitors to formulating and executing an MBSE strategy





Inhibitor	Industry (%)	Solution Providers (%)
Complexity of organizational impact and cultural resistance	~95	~85
Lack of interoperability between different vendors' tools	~95	~40
Confusion surrounding the concept and ROI of MBSE	~85	~85
Lack of experienced systems engineers	~75	~75
Lack of capability within MBSE tools and IT systems	~65	~25
Immature/incomplete data collaboration standards	~65	~15
Lack of knowledge or confidence in the technology	~55	~85


Industry's top selections (% of interviewees)

- Industry and solution providers agree on the complexity of organizational impact and cultural resistance is a principal inhibitor to MBSE implementation
- There is a significant disconnect between industry and solution providers on some key inhibitors
 - A substantial majority (60-100%) of industry interviewees consider interoperability, tool capability, and collaboration standards to be principal inhibitors
 - While only 15-40% of solution provider interviewees share their view

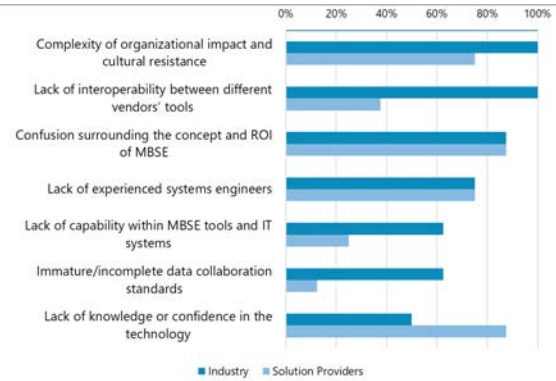
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Readiness Assessment



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Industry's top selections (% of interviewees)

Perspectives of Note

“The term MBSE has been overloaded and confused in the industry due to the generic nature of the definition. For example, if I consider my legacy spreadsheet of calculations the model, then I am doing model-based system engineering. As a result, companies have struggled to measure the ROI on MBSE.”

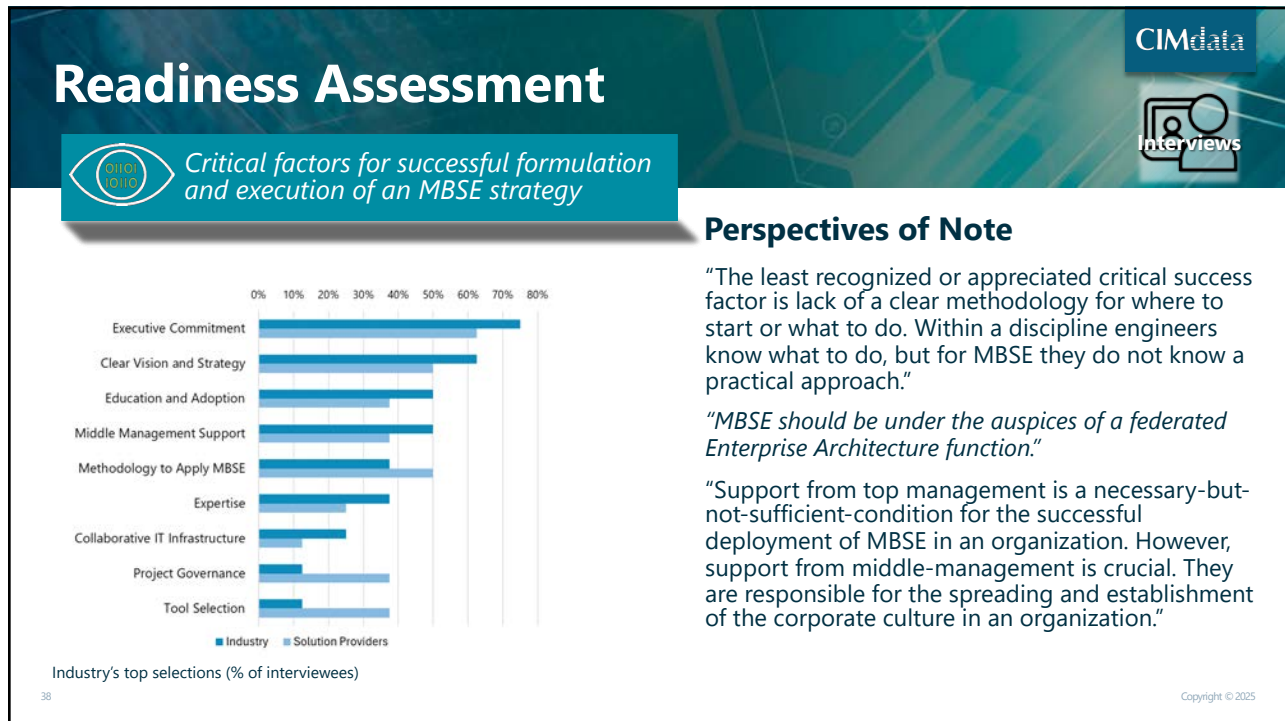
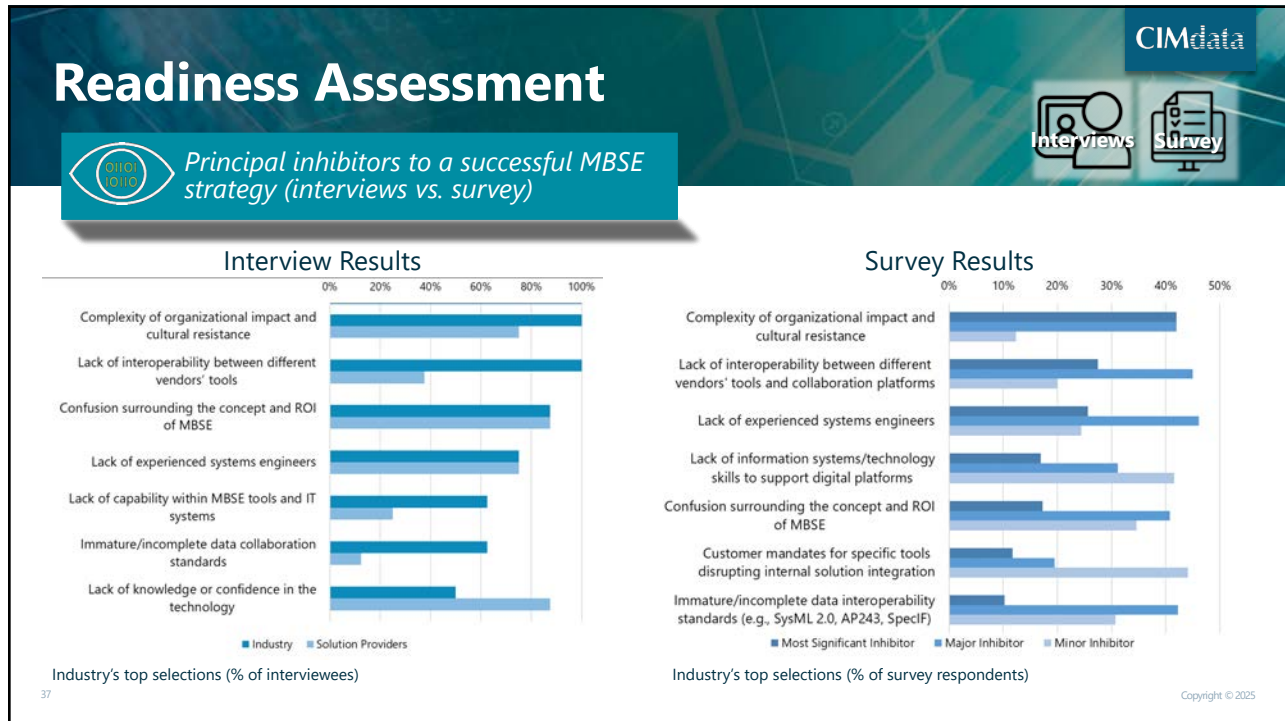
“Lack of interoperability between different vendors' tools and collaboration platforms is the Most Significant Inhibitor to executing an MBSE strategy. The appropriate mitigation is to promote the importance and then to demand interoperability.”

“Engineers will not adapt if it is difficult without managers telling them to do it. For that to happen the benefit i.e., ROI must be clear.”

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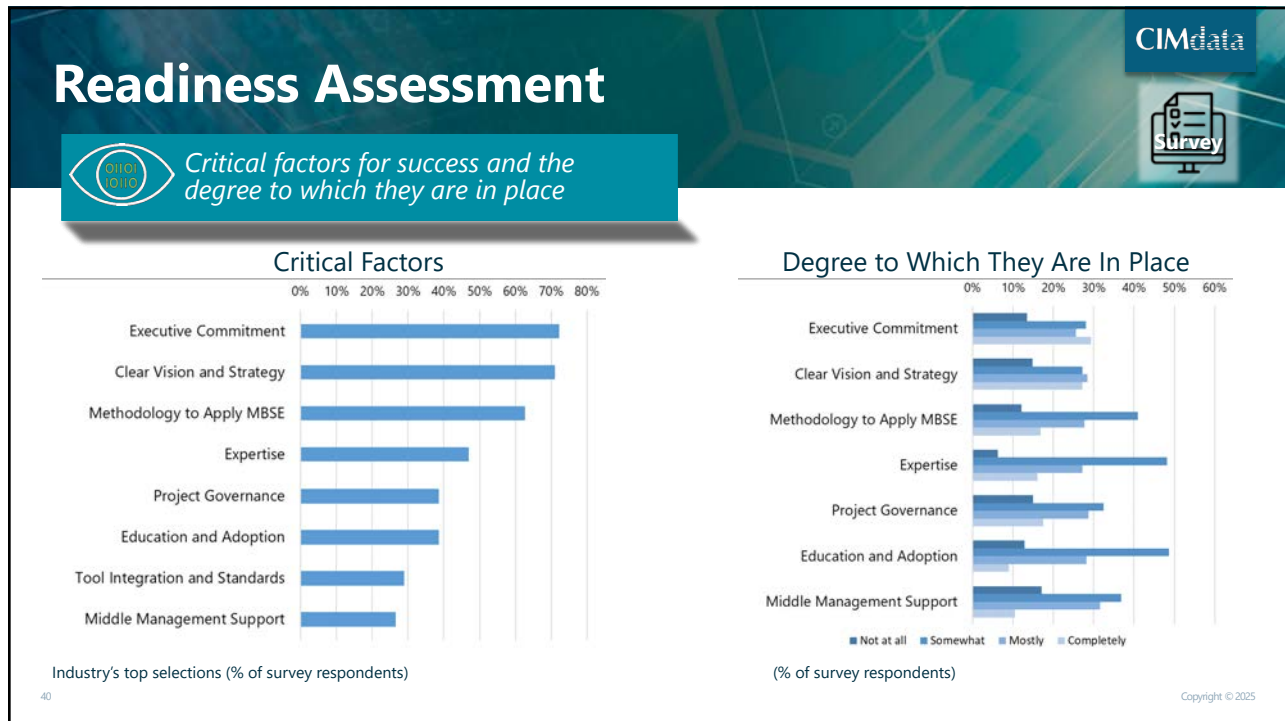
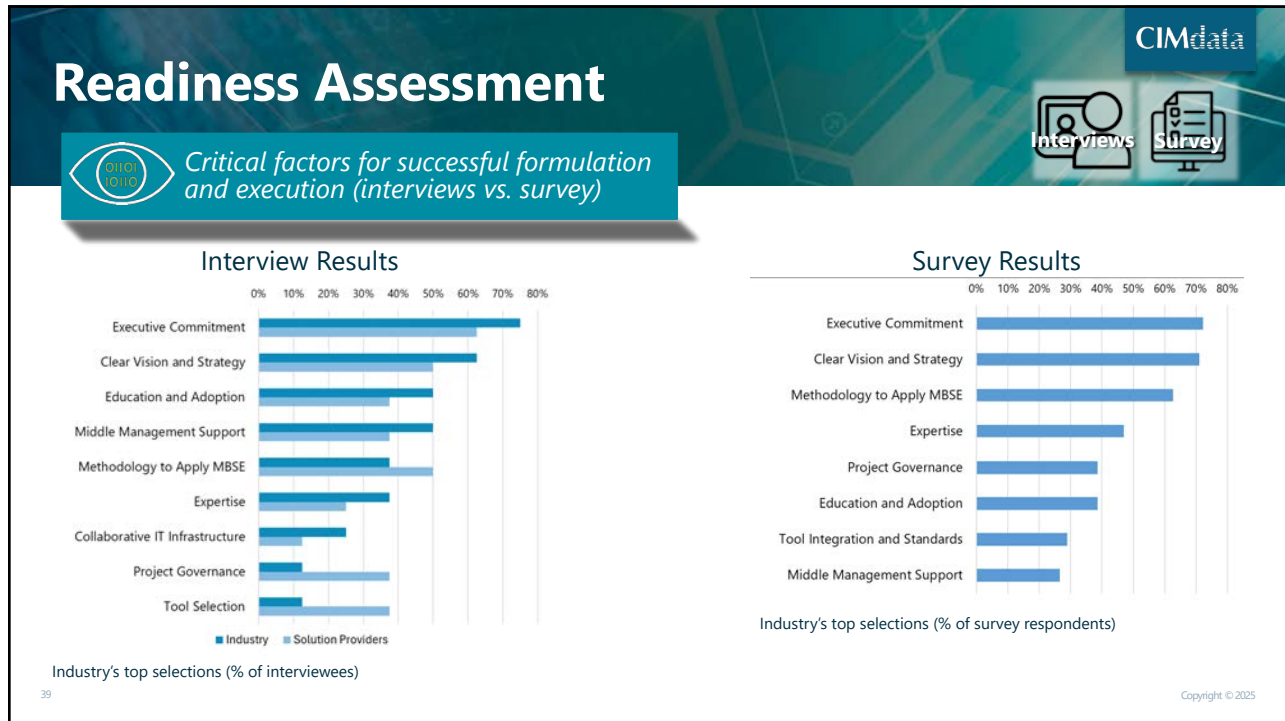
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Questions & Answers

 Please tell us what's on your mind



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