

MBSE Survey 2

INCOSE International Workshop
Jacksonville, Florida
Presented January 21-22, 2012

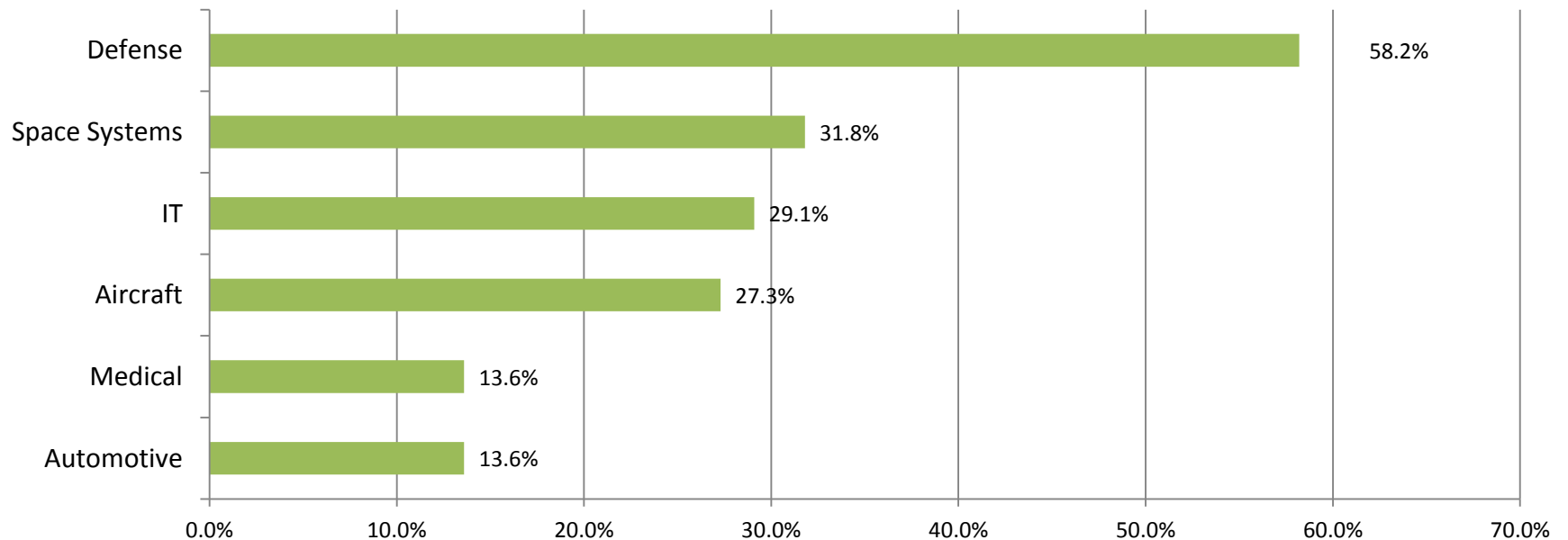
Prepared by
Dr. Robert Cloutier
Mary A. Bone

Question 1

- Please tell us about yourself. (Optional)
 - International Responses
 - Australia, Brazil, China, France, Germany, India, Japan, Jordan, Malaysia, Mexico, The Netherlands, Spain, Sweden, and U.S.A.
- 134 total responses as of 1/23/2012

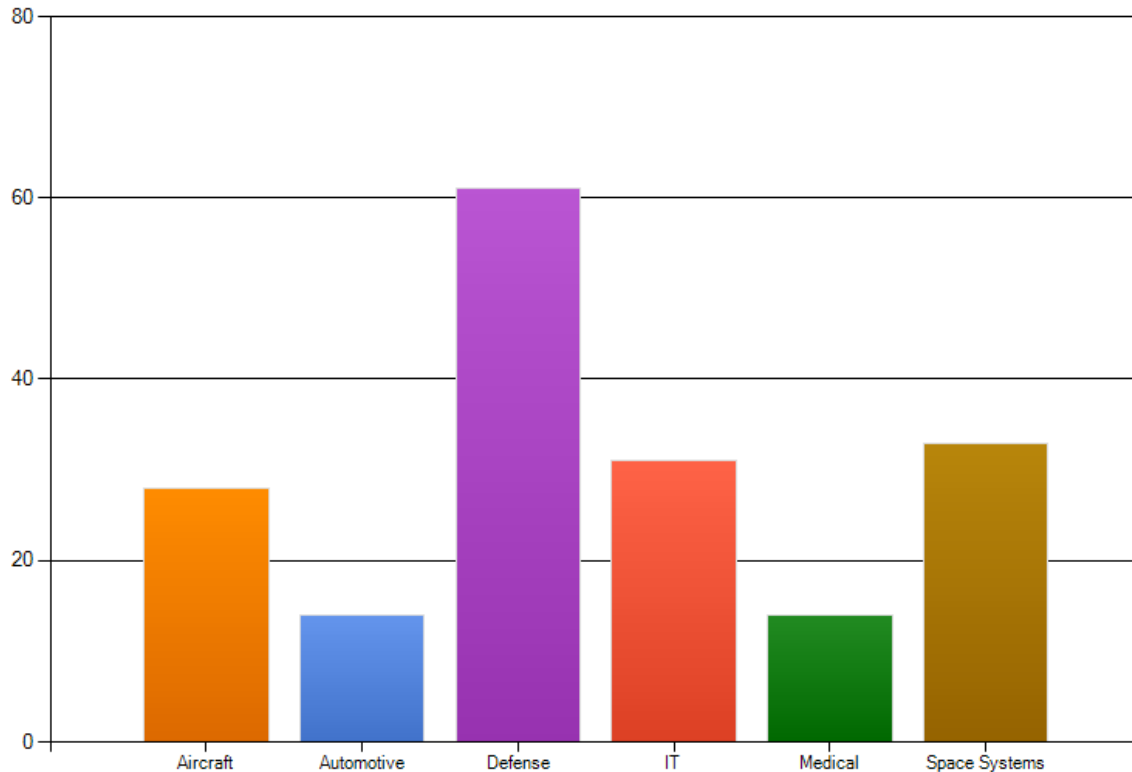
Question 2

What type(s) of industry and/or product(s) does your company represent? If your industry is not represented, do not check a box, simply type your answer in the "Other" field provided.



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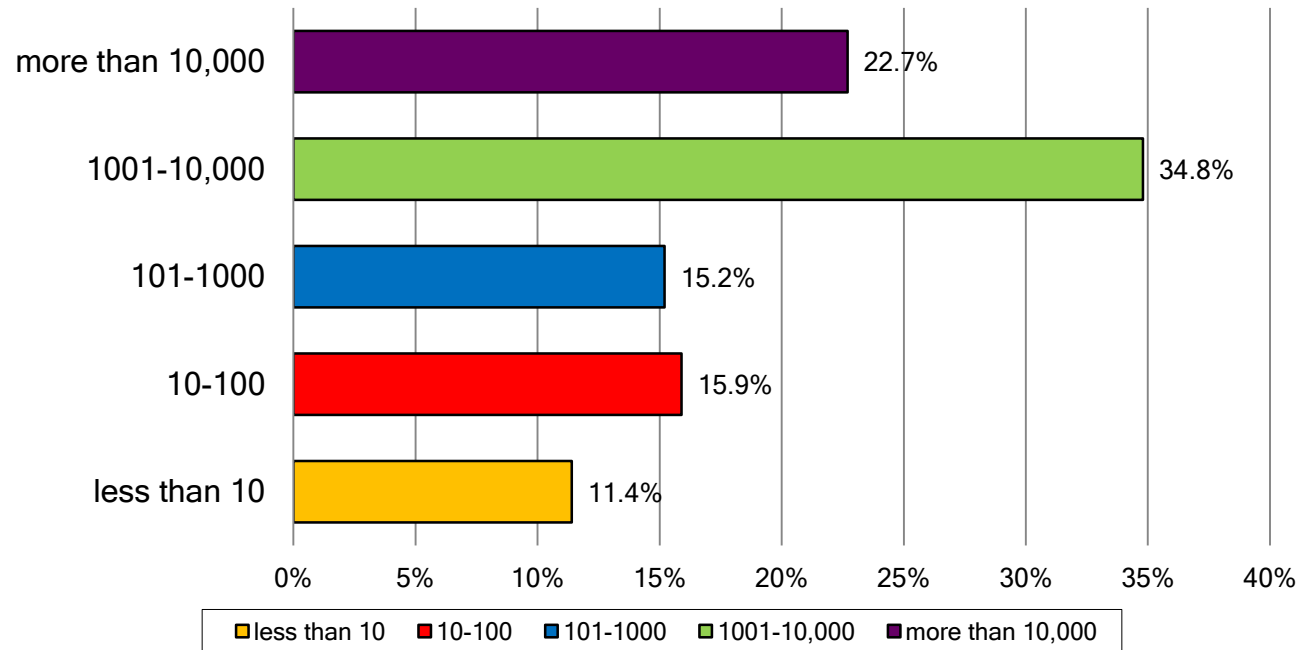


Responses for "Other":

- 4 Responses for Consulting
- 12 Responses for Education/Academic
- Off-road vehicles
- Tool vendor
- Modeling and Simulation
- Industrial
- Energy
- Networking equipment, software and services.
- Off-highway equipment
- Energy
- Surface and Air transportation
- Computer components
- Manufacturing, Mechanical Engineering
- Scientific Instrumentation
- Transportation
- Software
- Business
- Physical and biophysical systems
- Transit and transportation

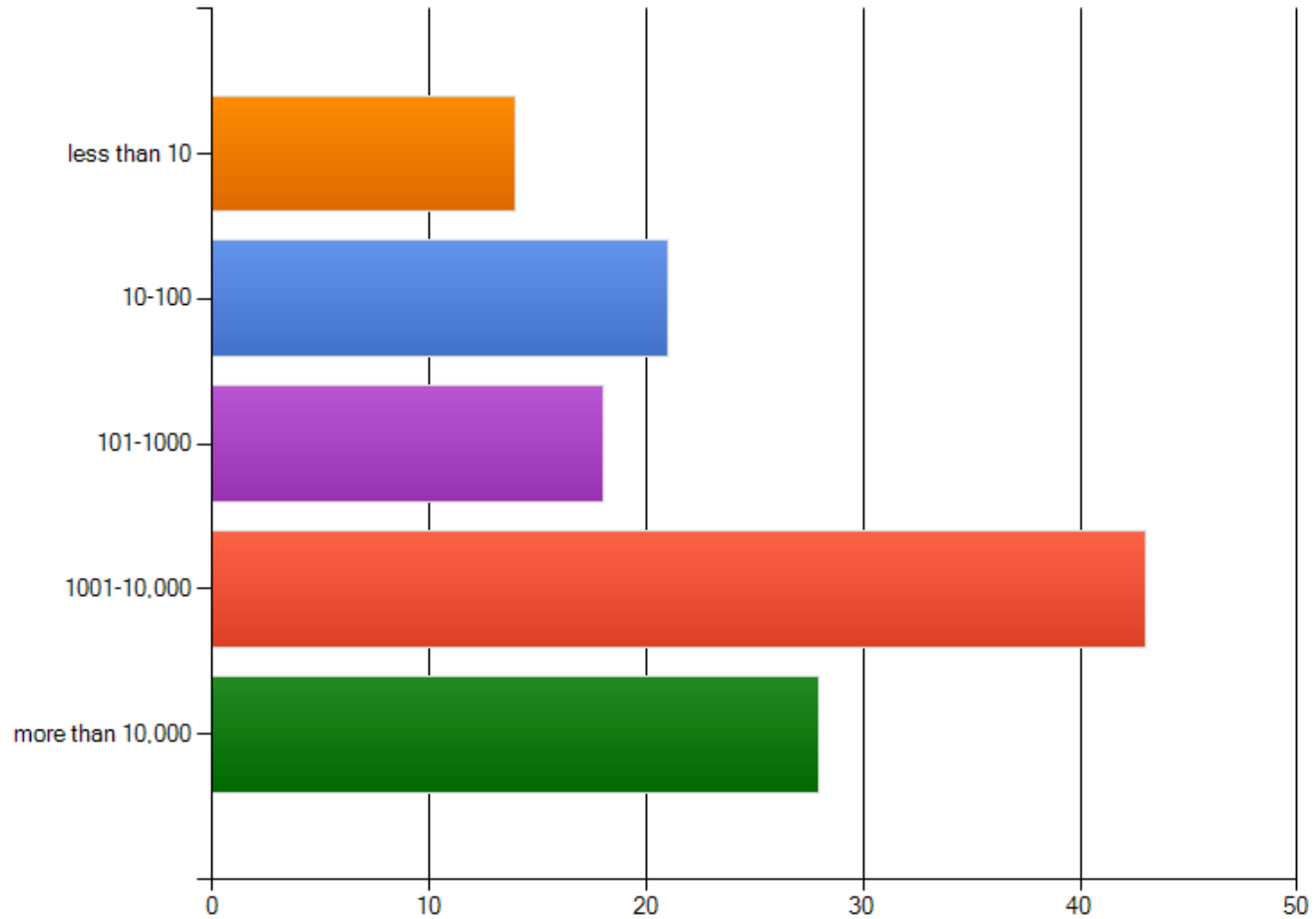
Question 3

How many engineers does your company/organization employ?



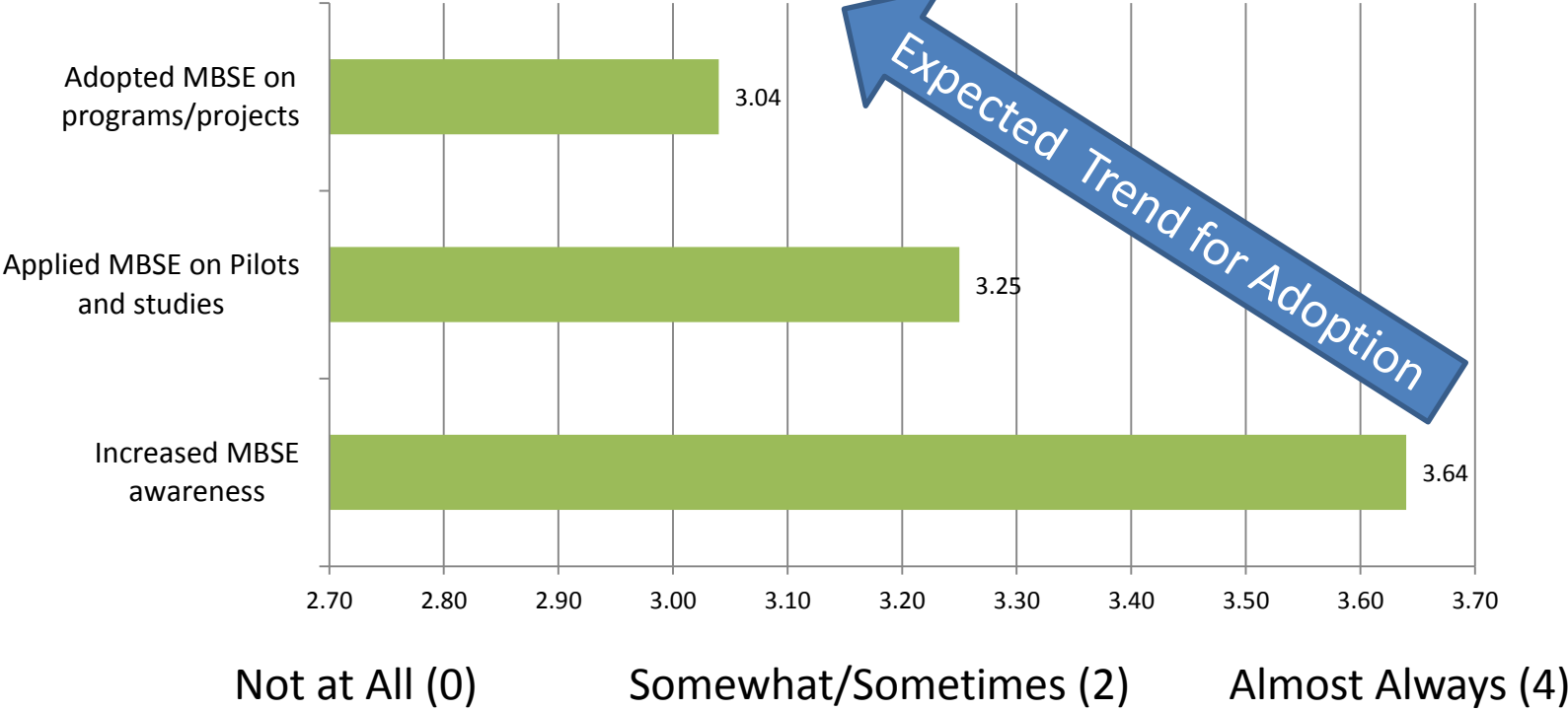
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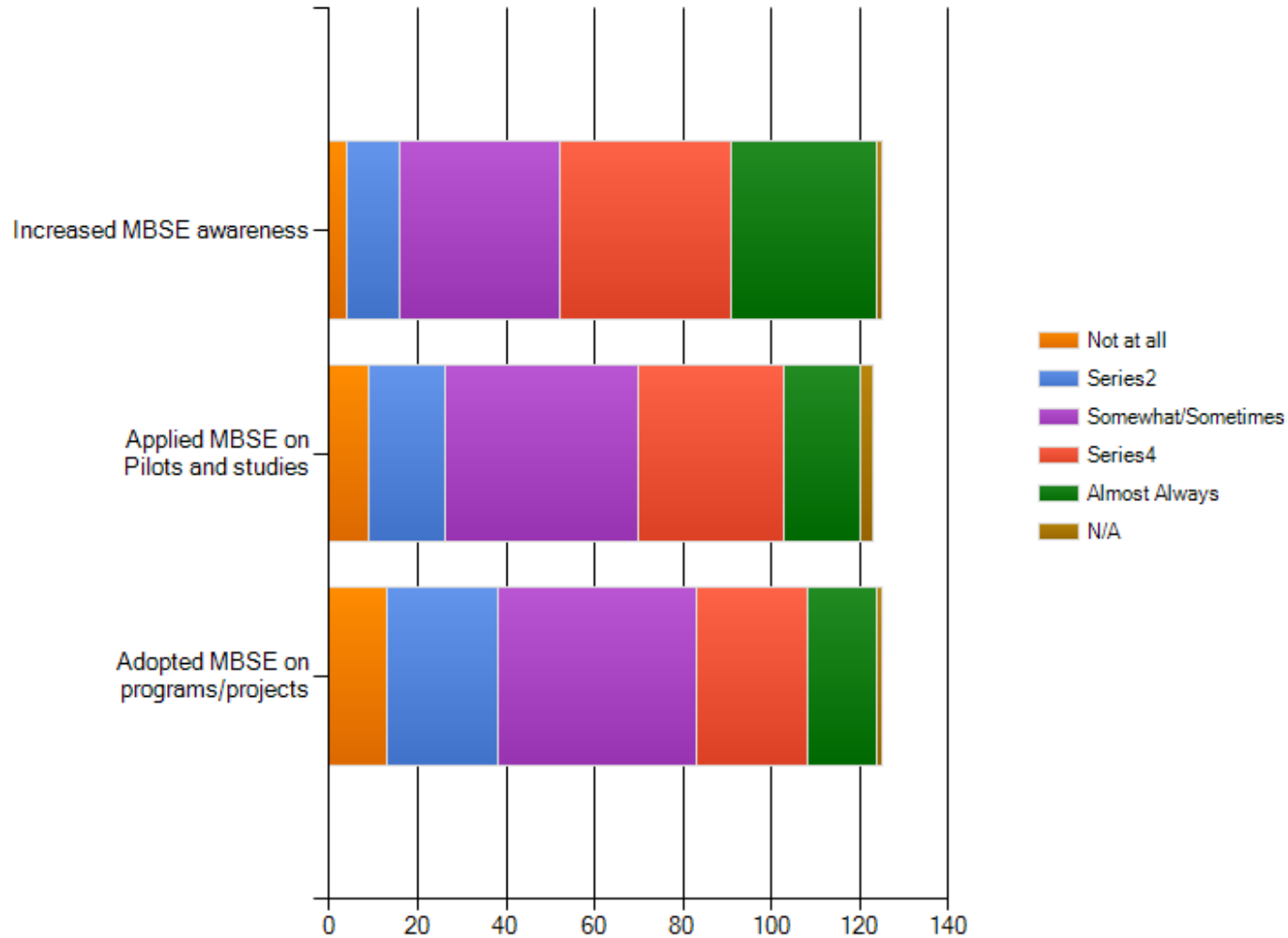
Question 4

To what extent in the last 3 years has your company/organization:



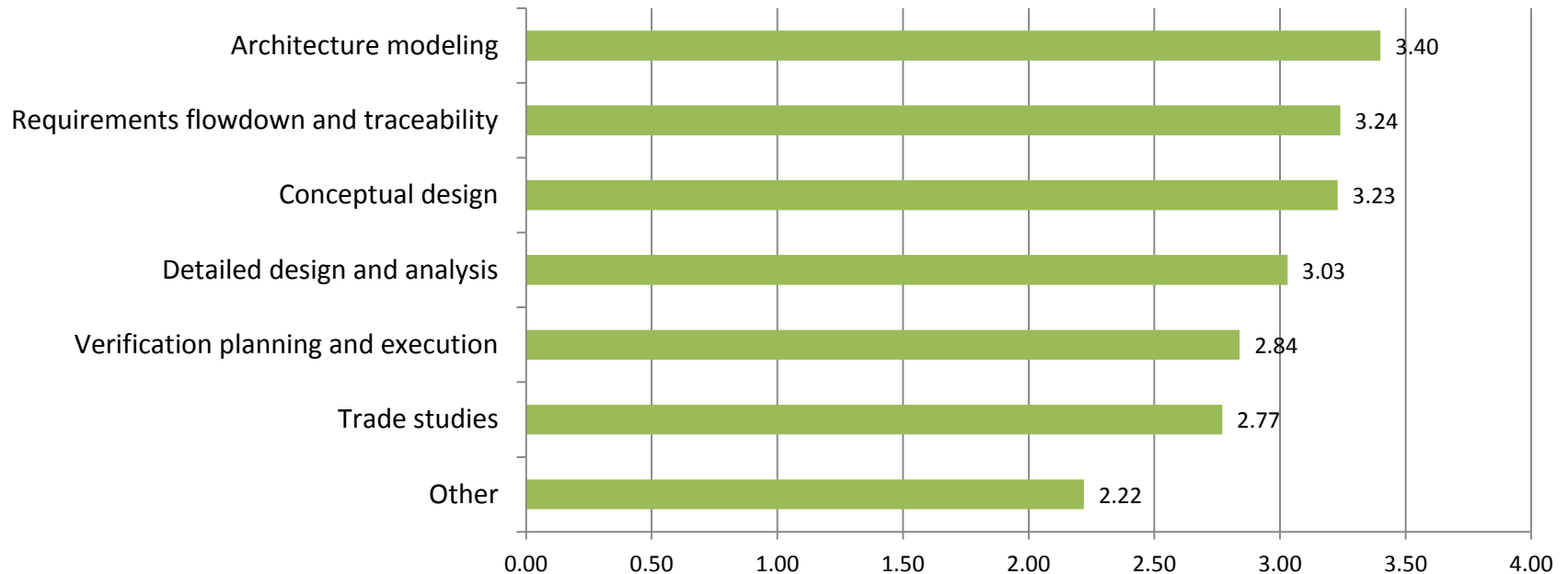
Question 4

To what extent in the last 3 years has your company/organization:



Question 5

What is the relative focus of the MBSE effort in your organization to support each of the following?



No Focus (0)

Some Focus (2)

Almost all Focus (4)

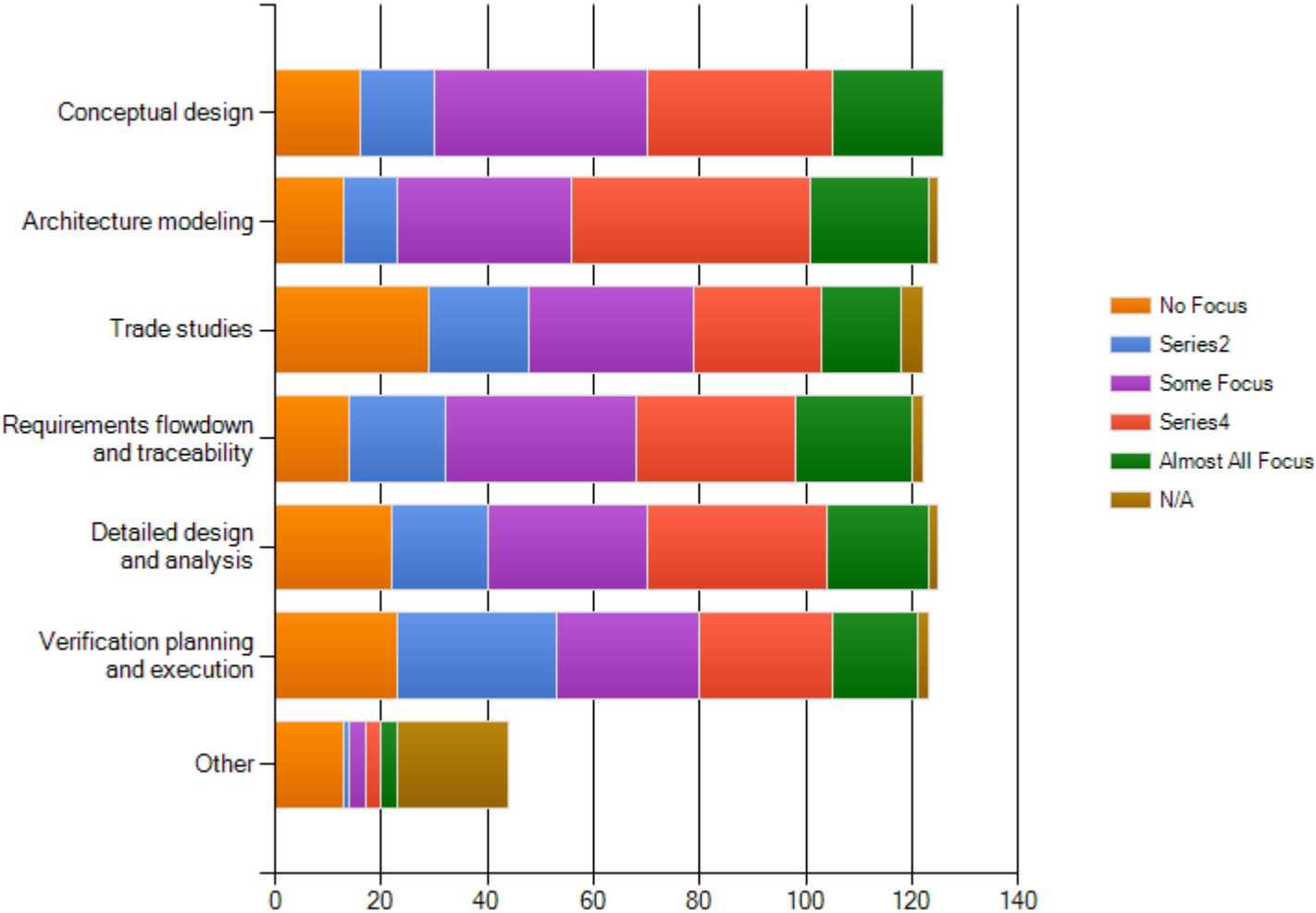
Responses for "Other"

- Application to acquisition
- Post-deployment support
- Capability Definition - users needs and stakeholder analysis
- Optimize functionality diagnostics and prognostics
- Modelisation of systems

- Manufacturing process planning, probabilistic models (belief aggregation), decision making
- Interface Definition
- Requirements Development and User CONOPs
- Troubleshoot during integration
- Capability definition

Question 5

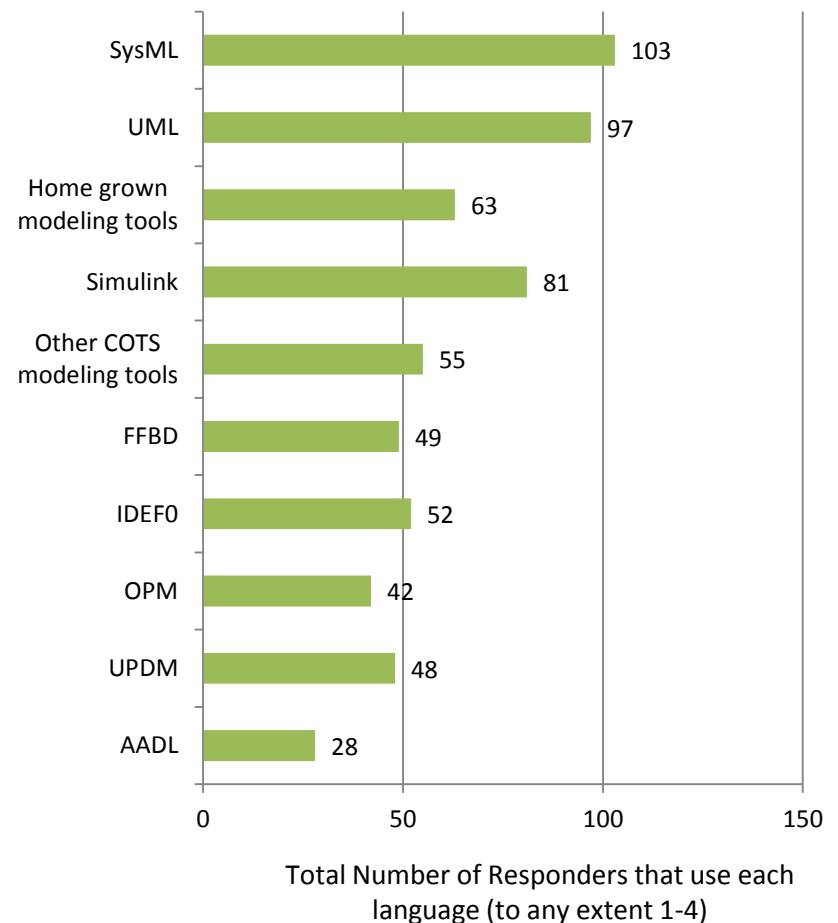
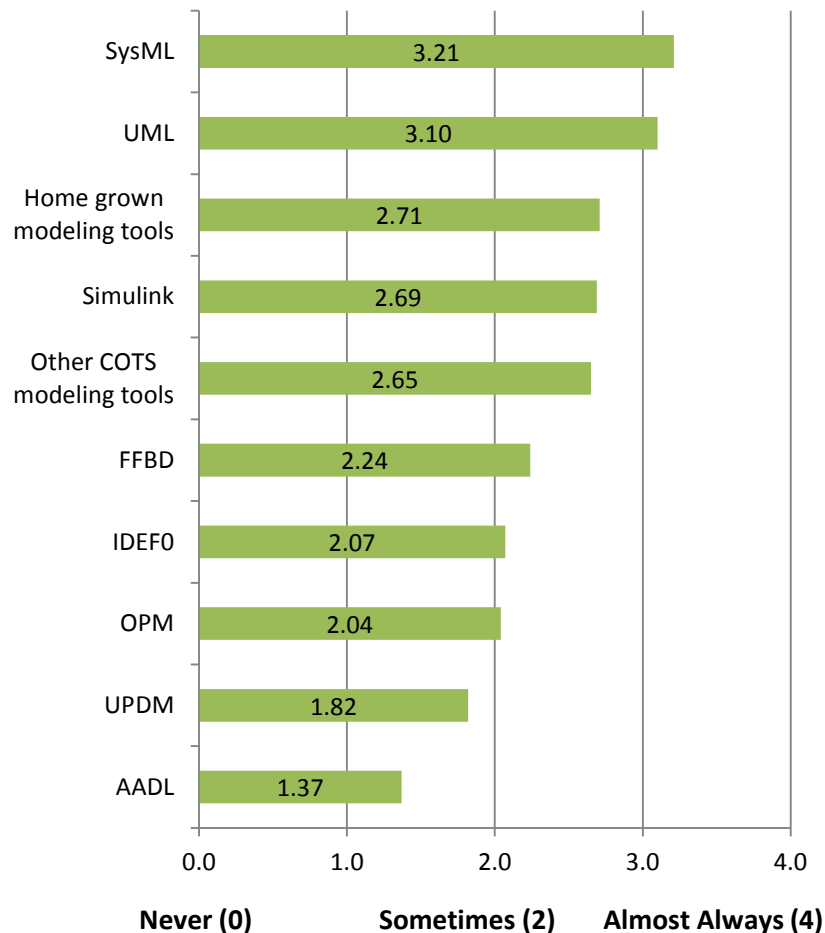
What is the relative focus of the MBSE effort in your organization to support each of the following?



Question 6

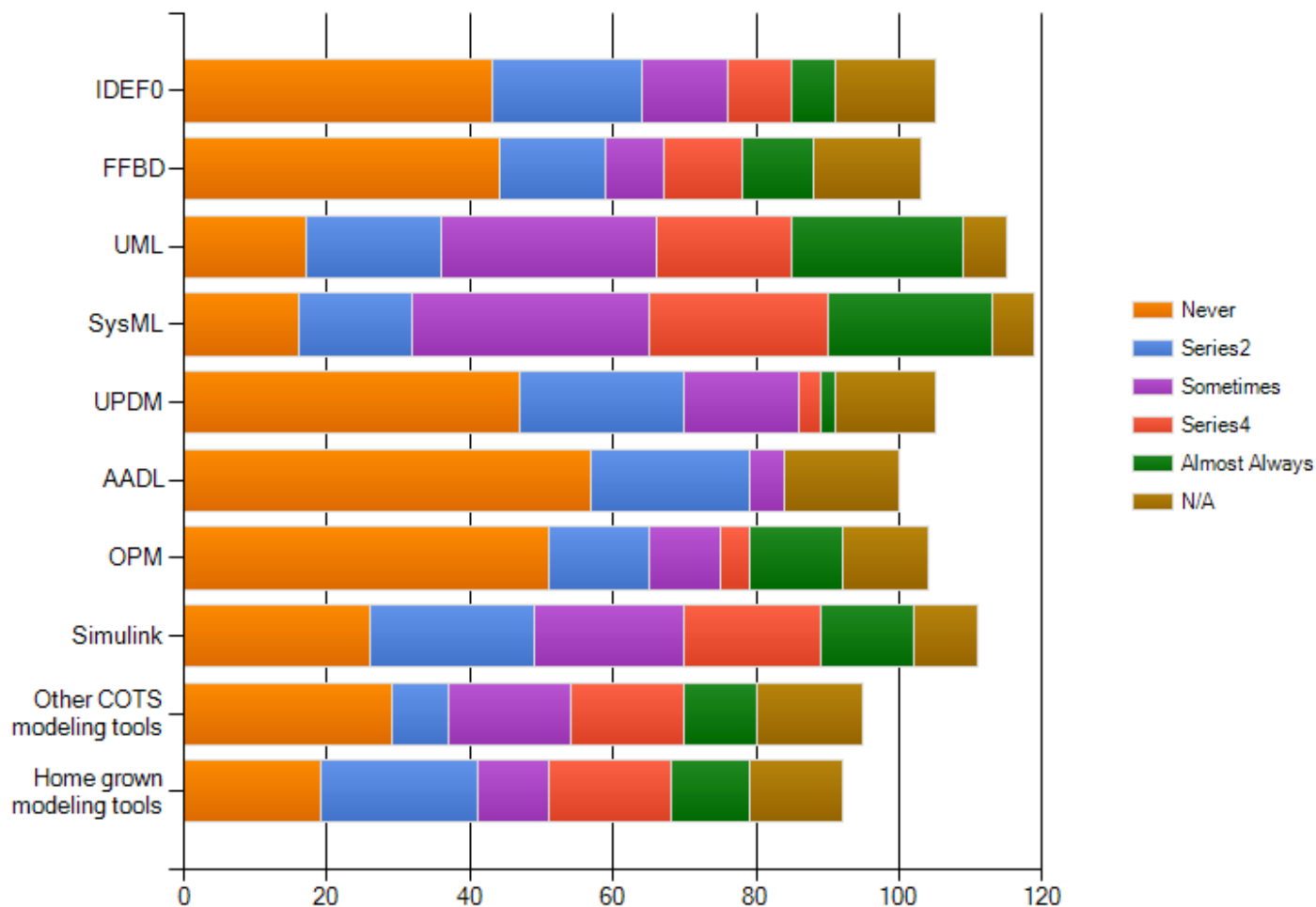
To what extent are the following modeling languages used for system architecture modeling as part of your MBSE effort?

Observation: While less than half the responders used homegrown tools they utilized them at a higher extent than many of the developed languages.



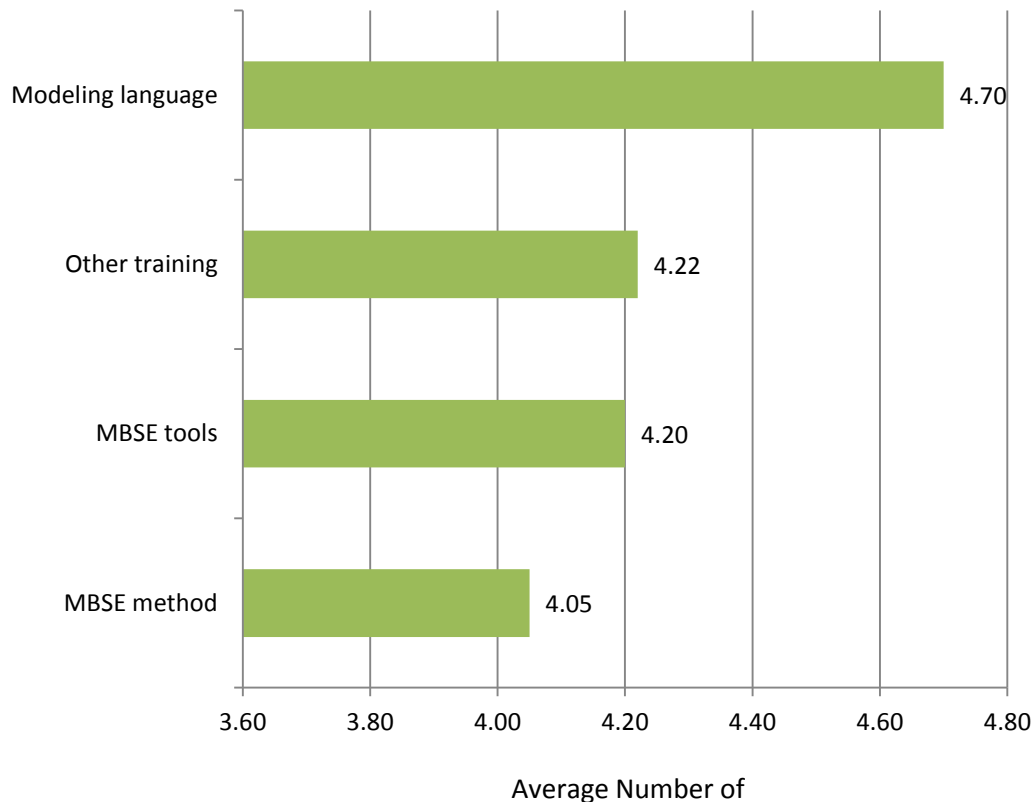
Question 6

To what extent are the following modeling languages used for system architecture modeling as part of your MBSE effort?



Question 7

How much formal training is typically offered, in number of days, to the team members involved in the modeling effort?

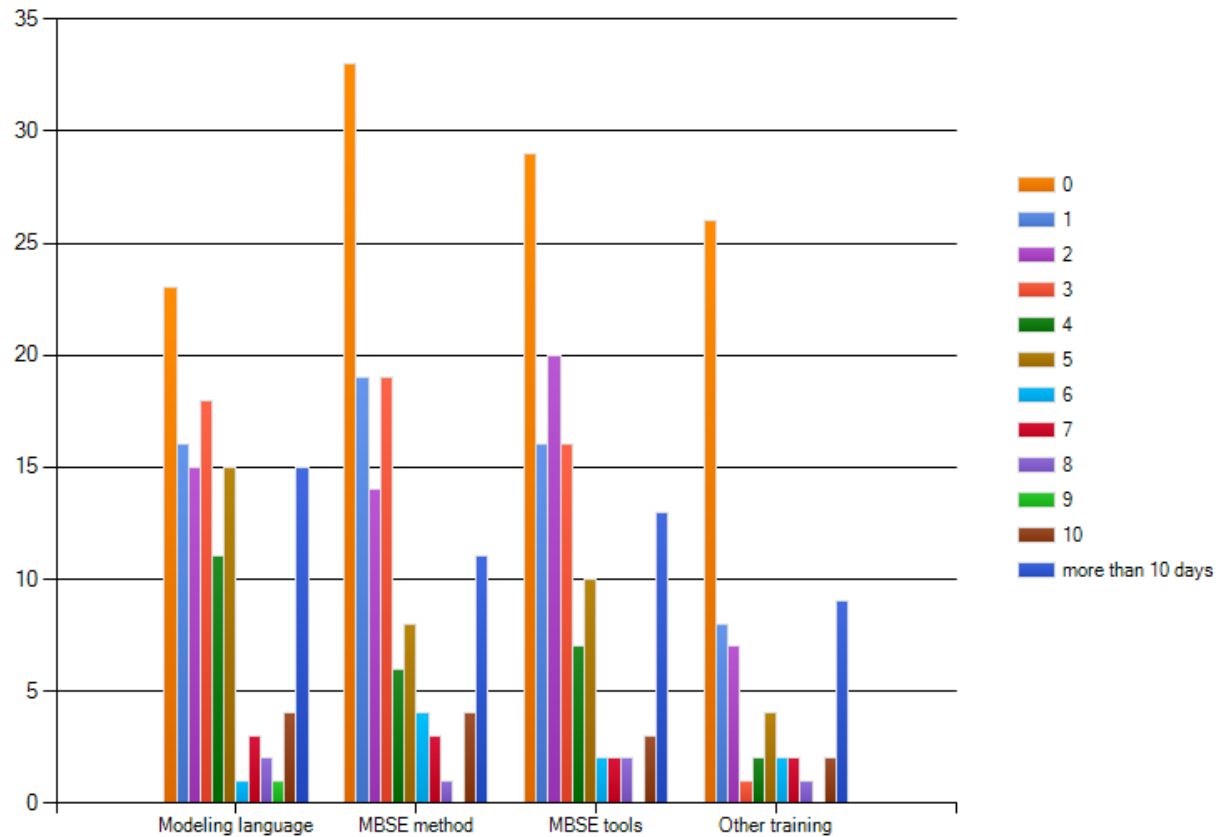


Responses to “Other”:

- One year Systems Engg & Product Design & development course at MIT
- Typically mix tools methods and languages together. Each have their own 4 day course but we typically tailor down to a combined week long course.
- Systems Engineering (general training)
- MBSE is included in the coursework for graduate and undergraduate students
- Note: varies widely: 0-10
- Available but material is out of date and not actively used
- specific SE training needed for MBSE
- General systems engineering; cognitive systems engineering
- decision theory, Modeling and Simulation
- Project Management
- It is difficult to get training regarding MBSE or related tools...some times which is very expensive and it is the problem of the training language also. I am from Germany and wanted to have the training but all trainings are in German not in English.
- Architecting & Systems Engineering
- We expect students/engineers/scientists to learn the tool/modeling language on their own
- Decision making using probabilistic analysis
- Self taught/self initiative.
- Our SE courses stress MBSE and using SysML/UML
- on-the-job training
- OJT
- Related SE training in architecture, requirements, etc.
- Books
- Category-theoretic mathematical modeling

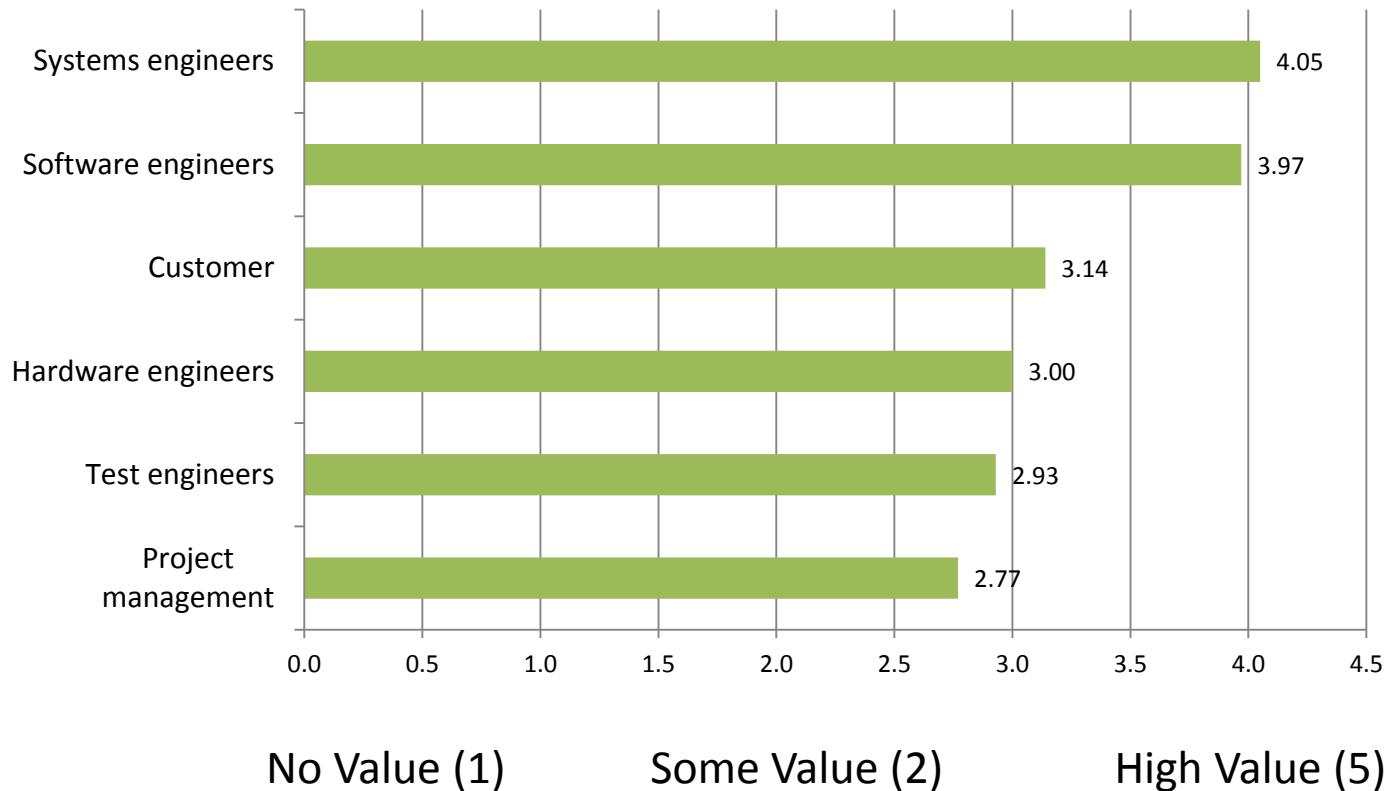
Question 7

How much formal training is typically offered, in number of days, to the team members involved in the modeling effort?



Question 8

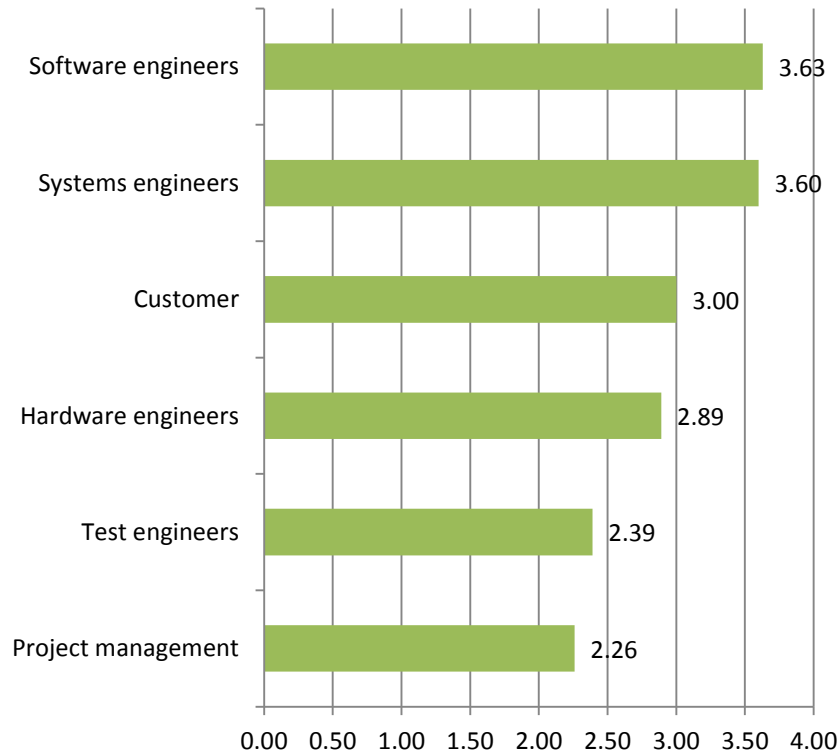
What is the perceived value of the modeling effort by each of the following?



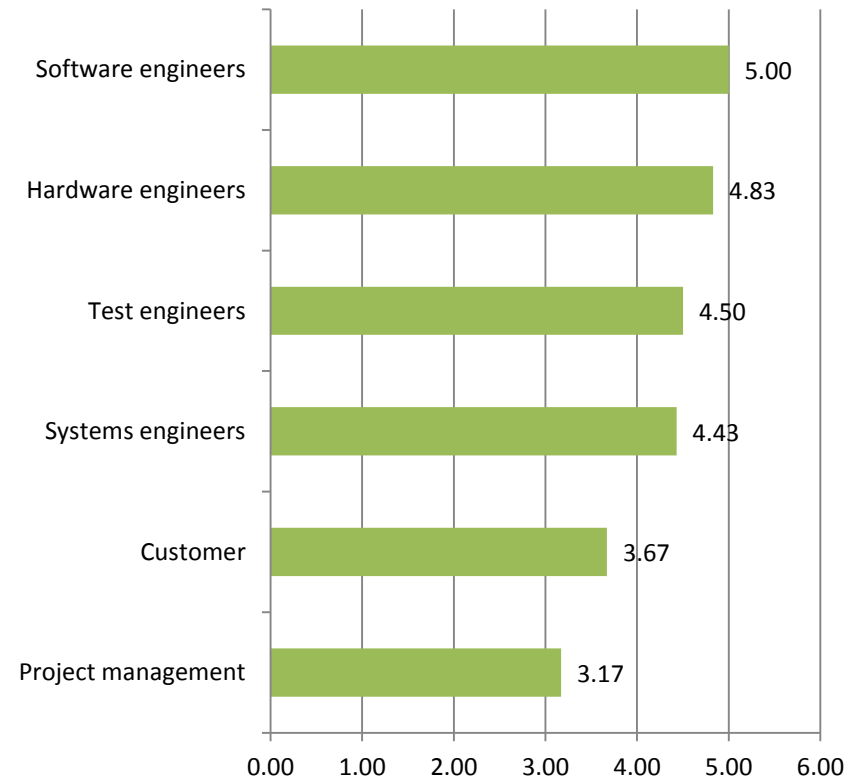
Question 8: What is the perceived value of the modeling effort by each of the following?

OBSERVATIONS: 1) Note the large differences of perceived value for those that had NO formal training to those that had more than 10 days of formal training. 2) The perceived value of project management as the smallest increase between the two sets of data.

Results for ONLY those that had NO formal training offered for Modeling language, MBSE tools, AND MBSE Methods

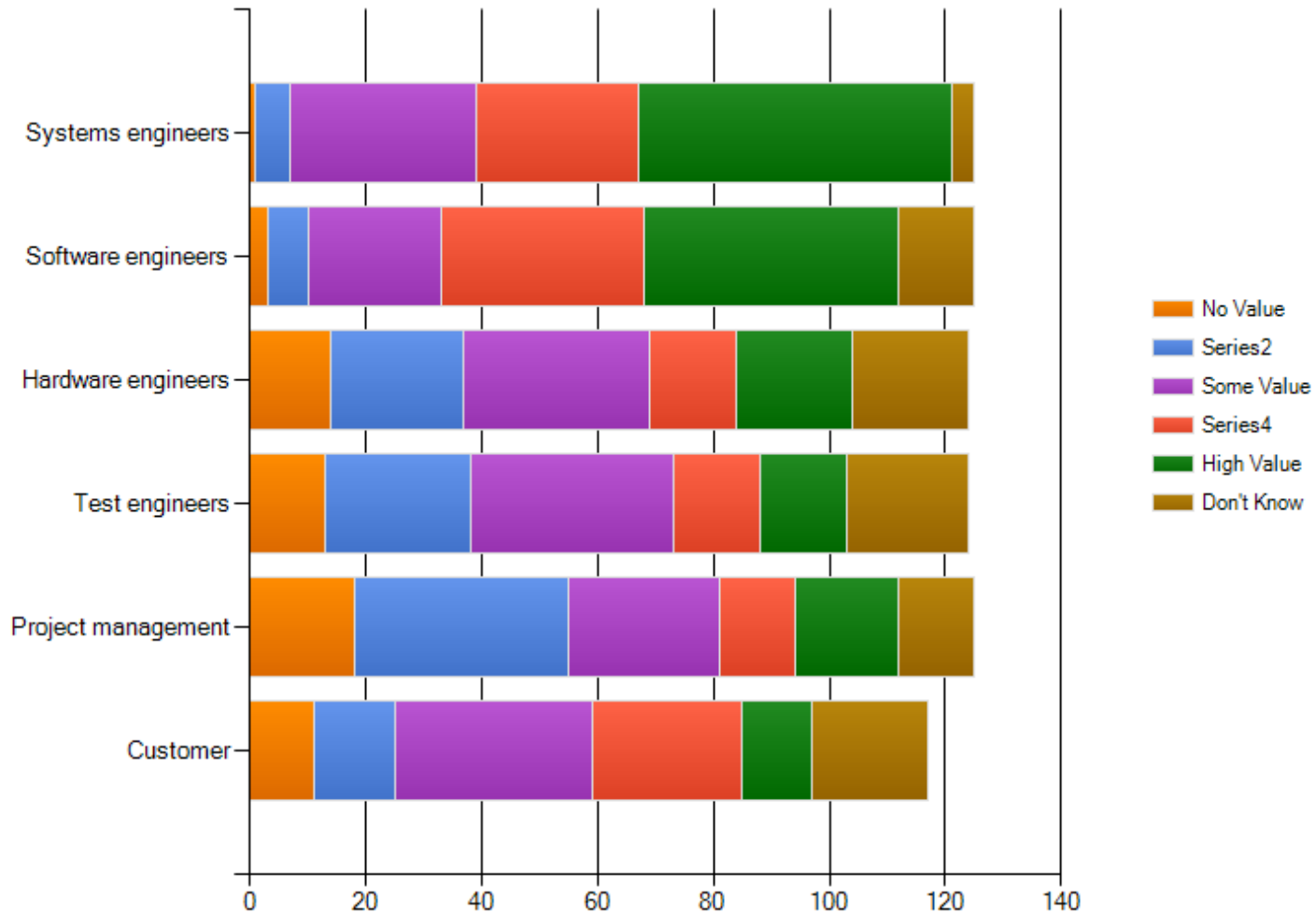


Results for those that had MORE than 10 days training for for Modeling language, MBSE tools, AND MBSE Methods



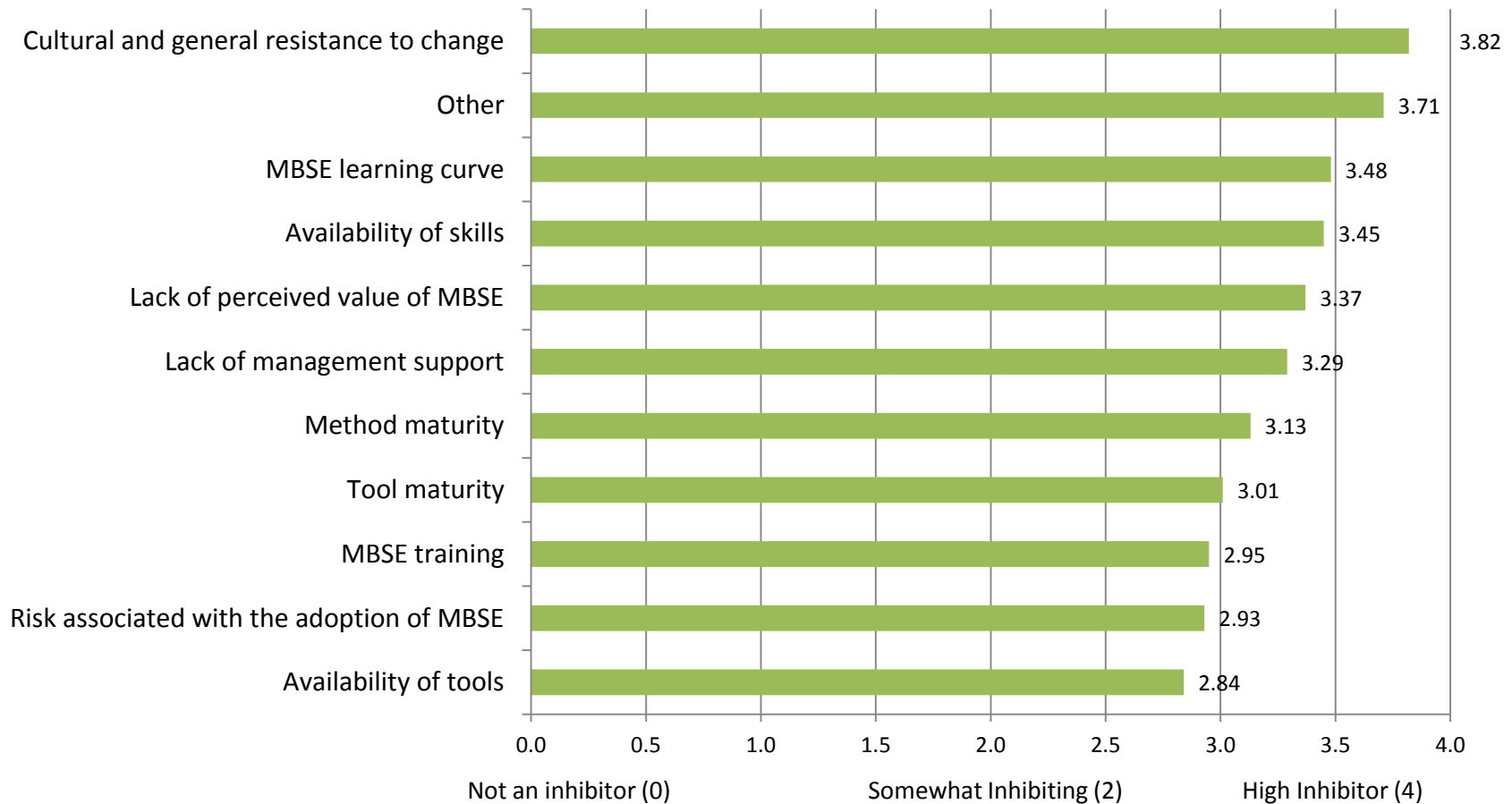
Question 8

What is the perceived value of the modeling effort by each of the following?



Question 9

Rank each item below in terms of the extent that it currently inhibits successful adoption of the MBSE within your organization/company.

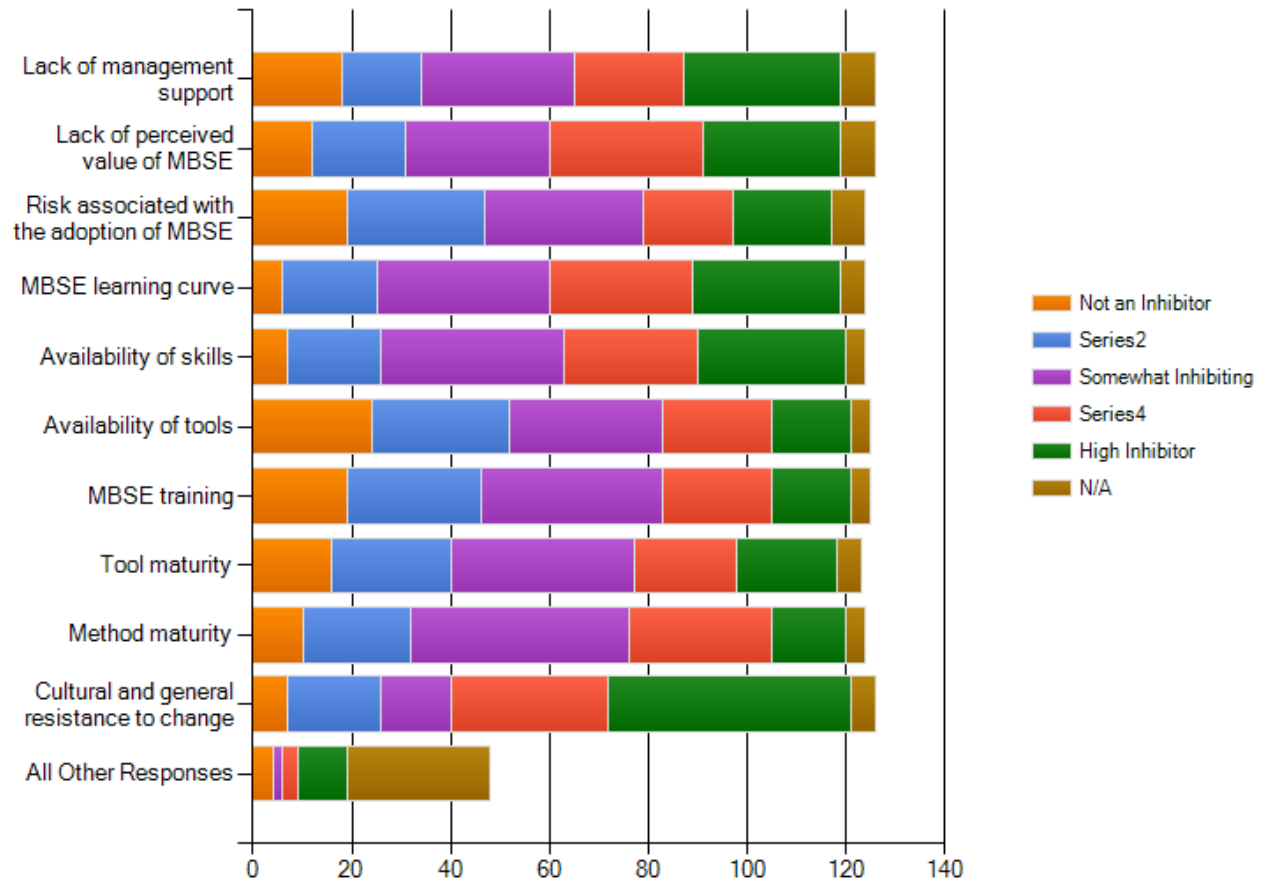


Question 9: Subset of Responses for “Other”

- Chicken-and-egg problem...need success to justify investment
- Main problem is interoperability in the CAD-CAE-CAM tool chain. How can for example SysML/OPM models be directly imported to Simulink/Simscape etc....
- SysML is seen as an emerging standard, but the language is too complex. It should be simplified to enhance adoption.
- Ultimately, there is a general lack of awareness of MBSE on the hardware side. There is some awareness on the software side but I don't see a push in that effort.
- Lack of wider community and standard practices in our industry..
- Lack of resources (i.e., funds) to make the changes necessary for adoption.
 - Note that this type of response was repeated a few times
- Tools have poor visualization capabilities. Simple updates to snap-and-glue would greatly increase usability. Fear of the mbse process being too new makes it risky to try to implement on large scale programs

Question 9

Rank each item below in terms of the extent that it currently inhibits successful adoption of the MBSE within your organization/company.



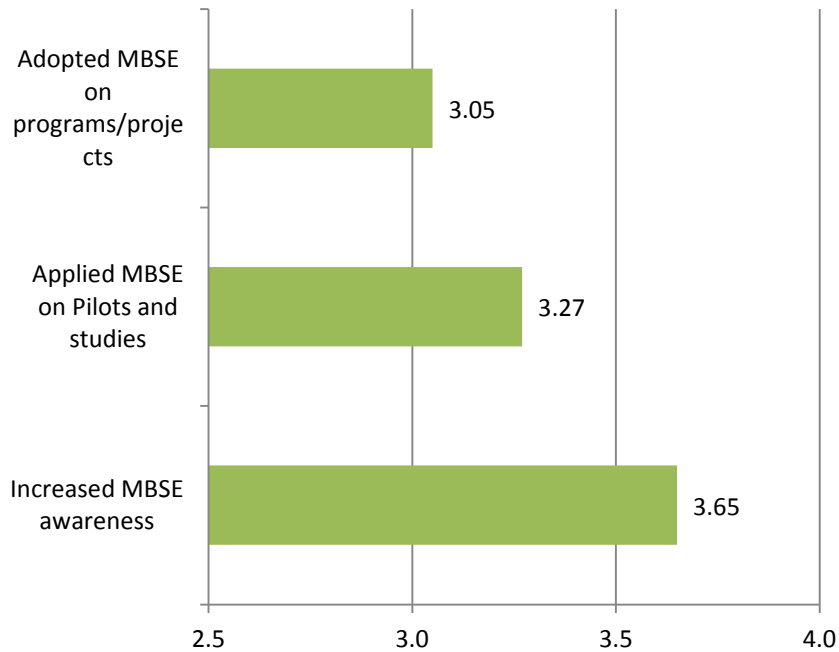
Company Size Broken into 1-1000 Engineers and More than 1000 Engineers

1-1000 is represented by 57 responses

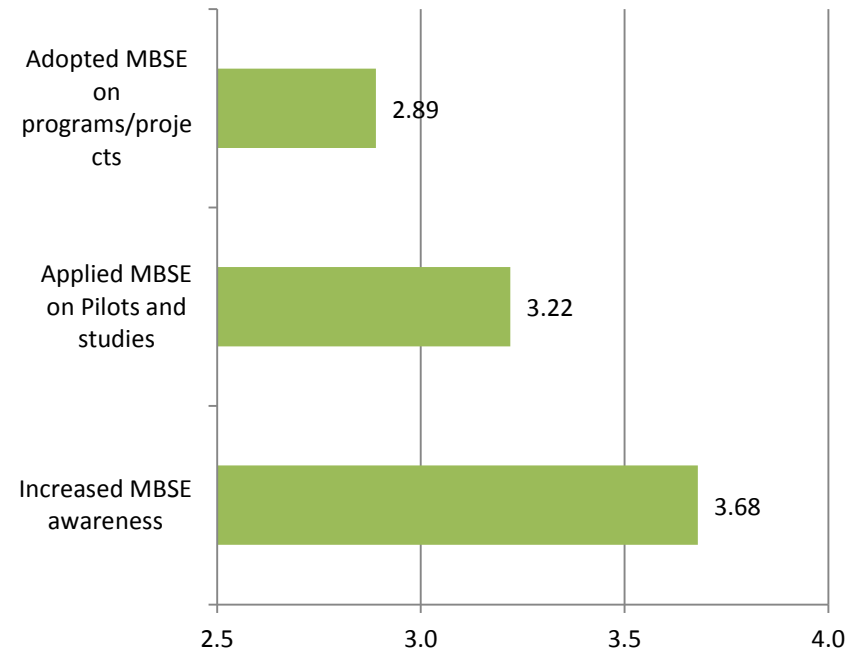
More than 1000 is represented by 82
responses

Question 4: To what extent in the last 3 years has your company/organization:

1-1000 Engineers



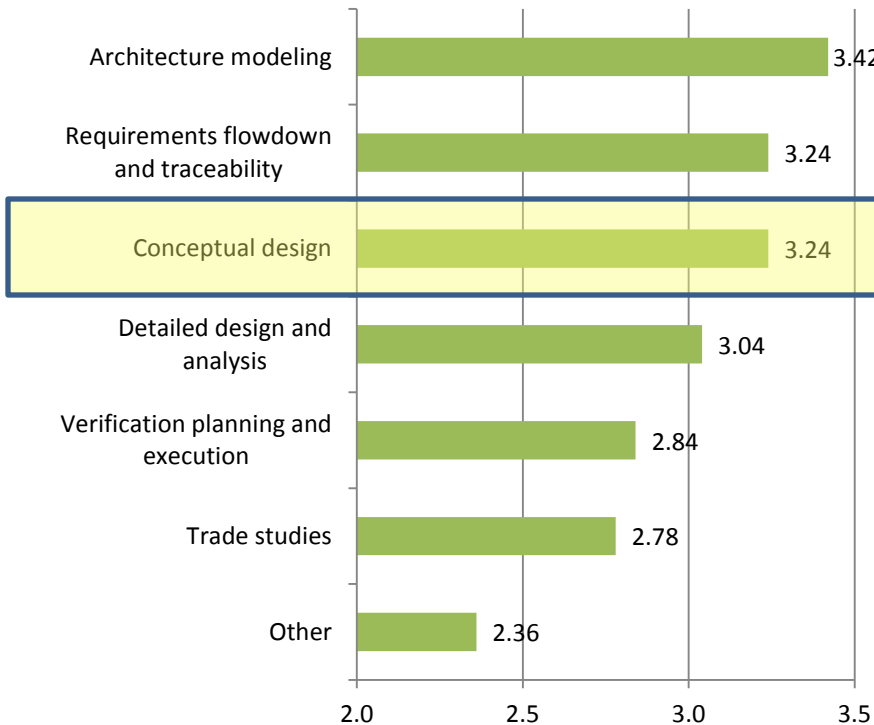
More than 1000 Engineers



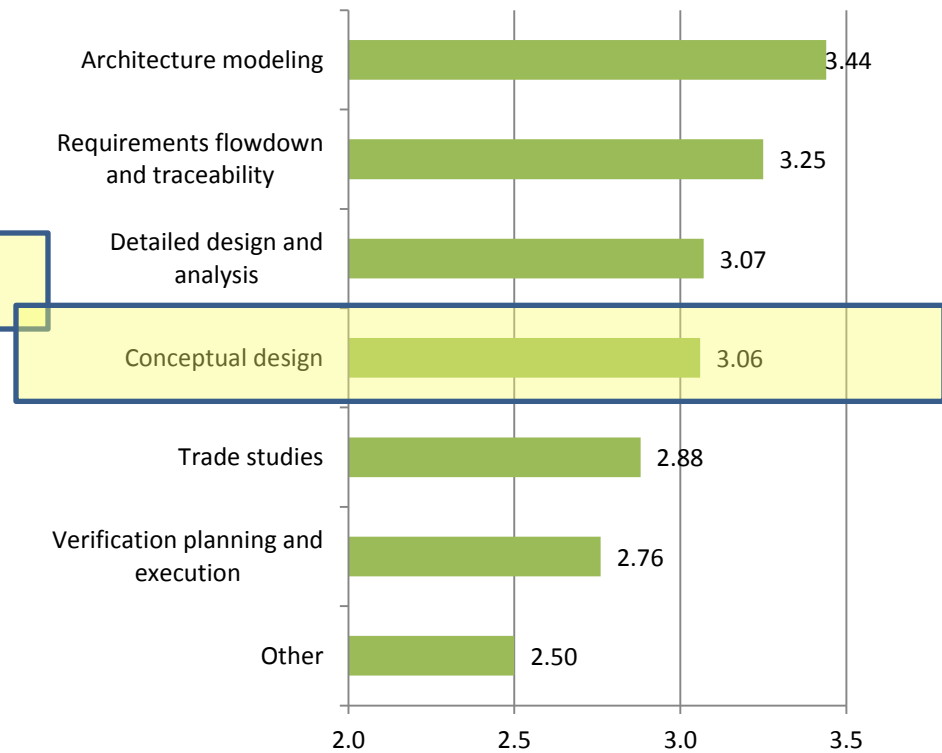
Observation: Small companies and large companies seem to be adopting at same rate

Question 5: What is the relative focus of the MBSE effort in your organization to support each of the following?

1-1000 Engineers



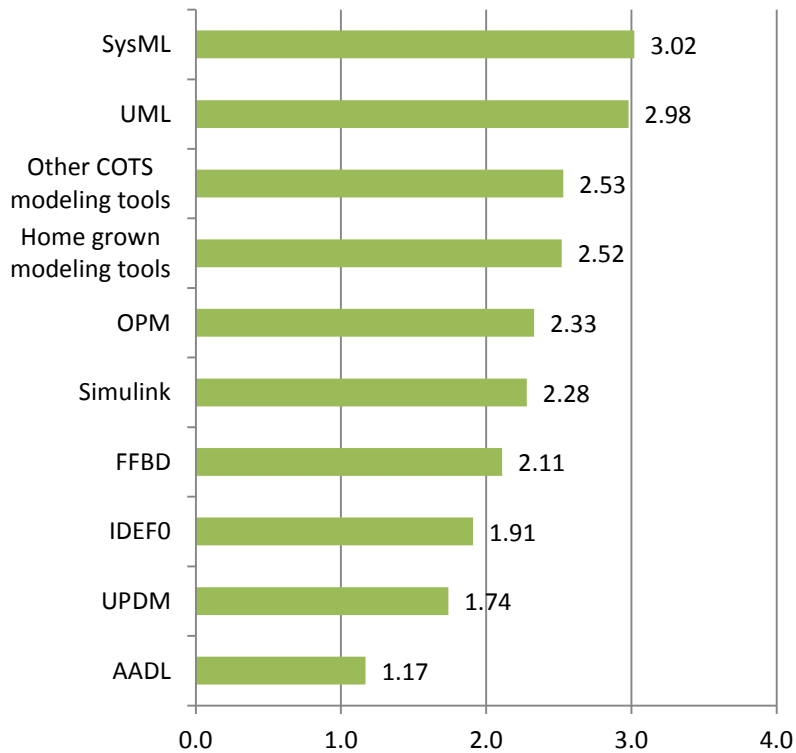
More than 1000 Engineers



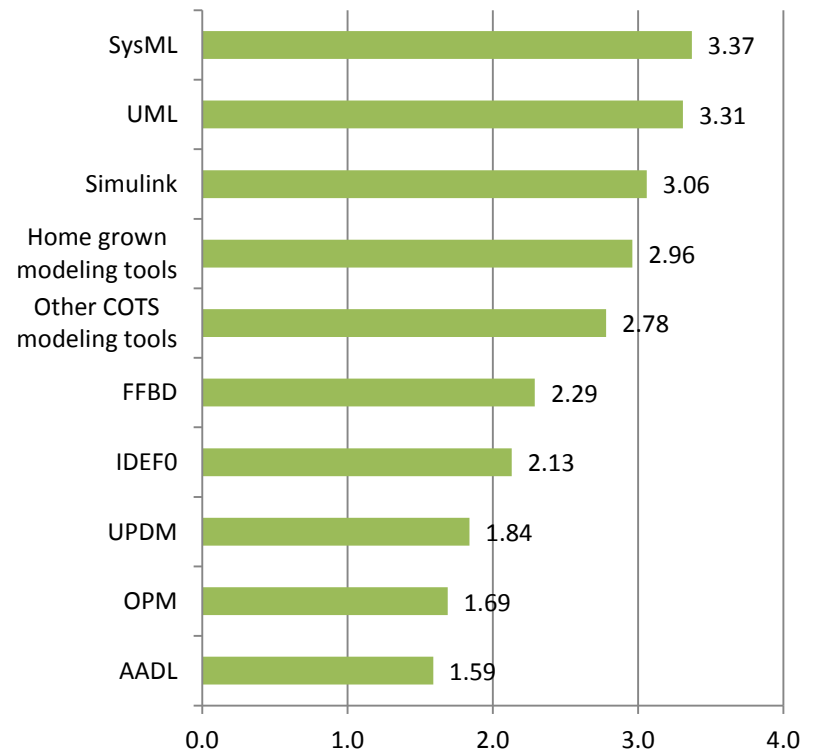
OBSERVATION: Small to Medium size companies are more focused on using MBSE at the Conceptual design phase than large companies.

Question 6: To what extent are the following modeling languages used for system architecture modeling as part of your MBSE effort?

1-1000 Engineers



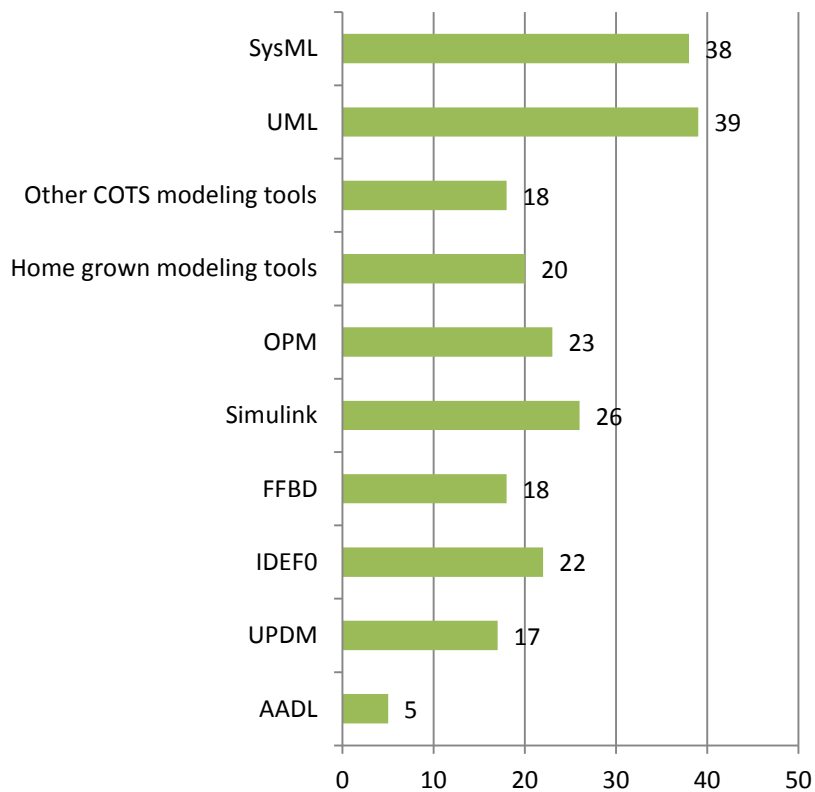
More than 1000 Engineers



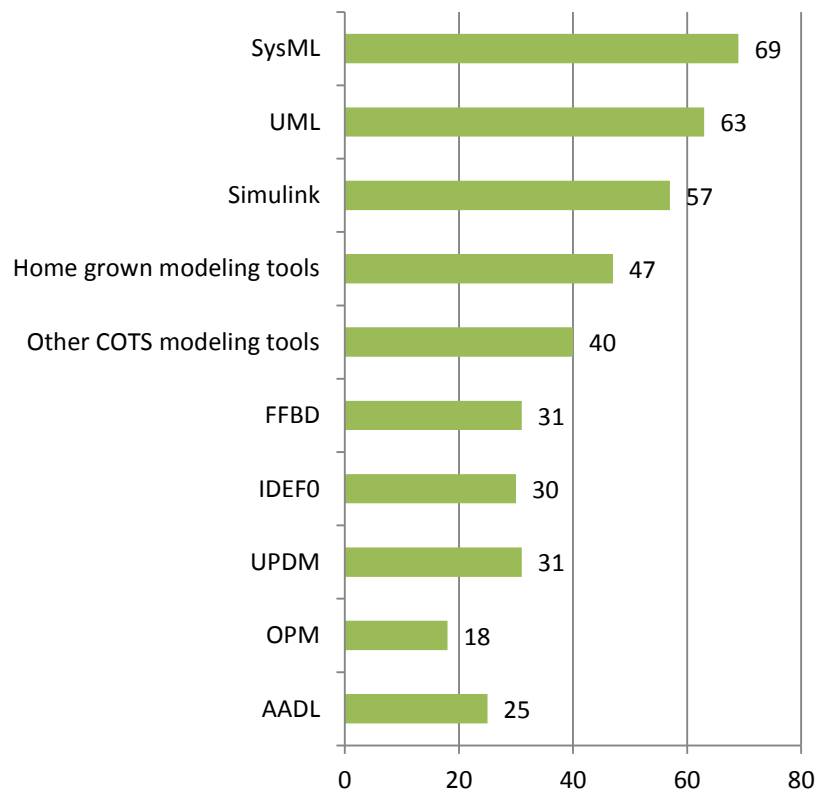
OBSERVATION: Small to Medium size companies do not utilize MBSE languages in system architecture as much as larger companies which is shown by all the numbers for small to medium companies being smaller than larger companies.

Question 6 With Regards to Total Number of People that Use the Language

1-1000 Engineers

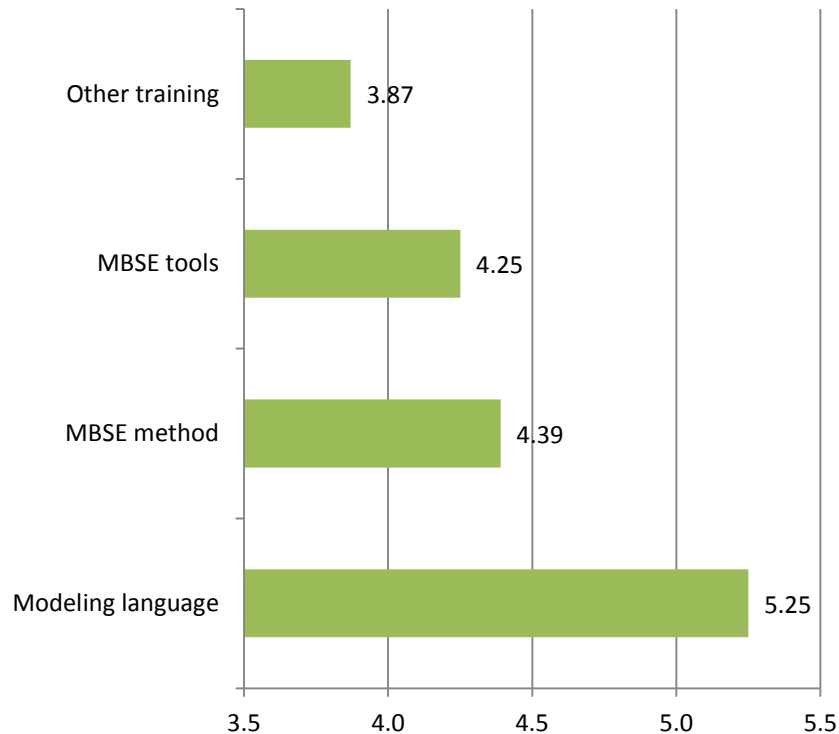


More than 1000 Engineers

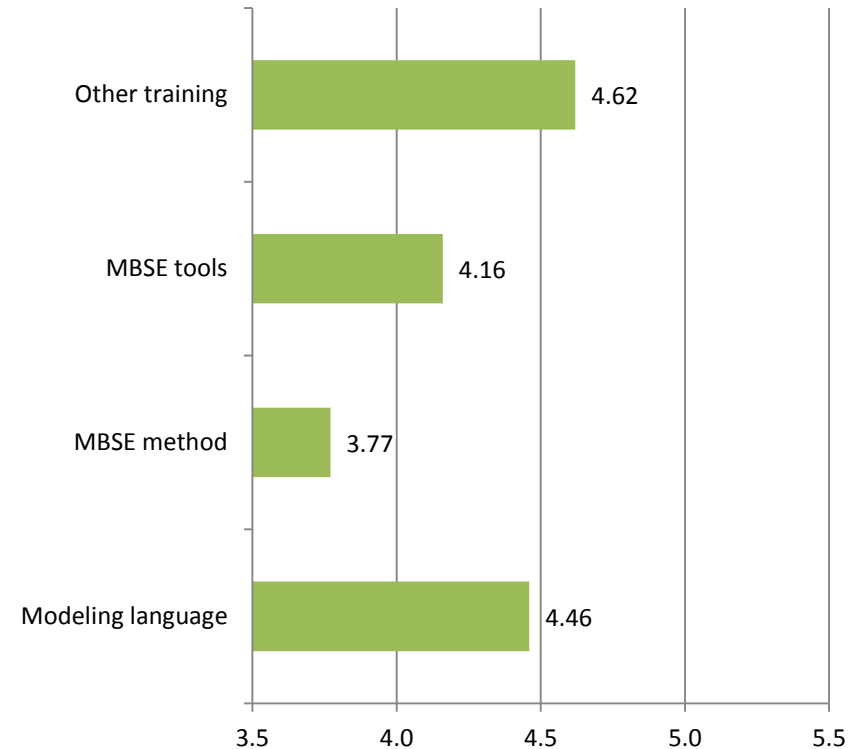


Question 7: How much formal training is typically offered, in number of days, to the team members involved in the modeling effort?

1-1000 Engineers



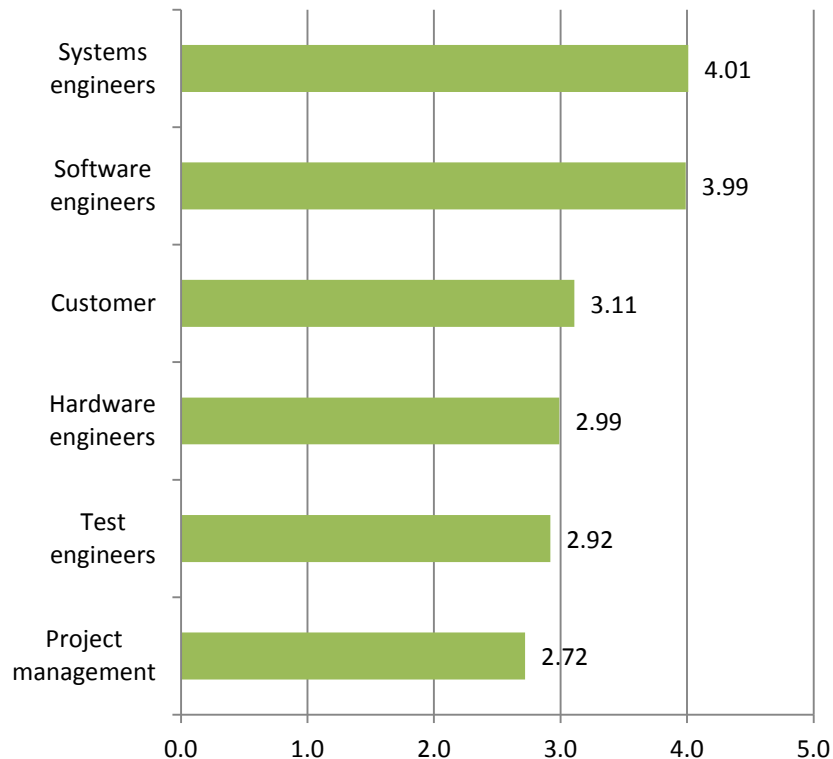
More than 1000 Engineers



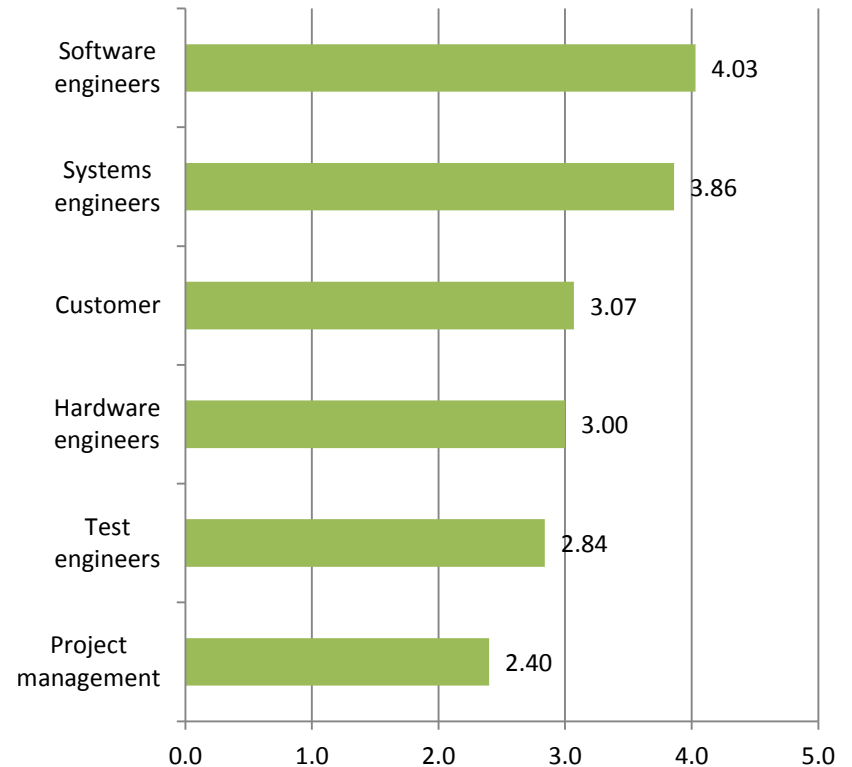
OBSERVATION: Small to Medium companies had more formal training in MBSE than larger companies. Although the larger companies had more “Other” training which needs to be investigated.

Question 8: What is the perceived value of the modeling effort by each of the following?

1-1000 Engineers



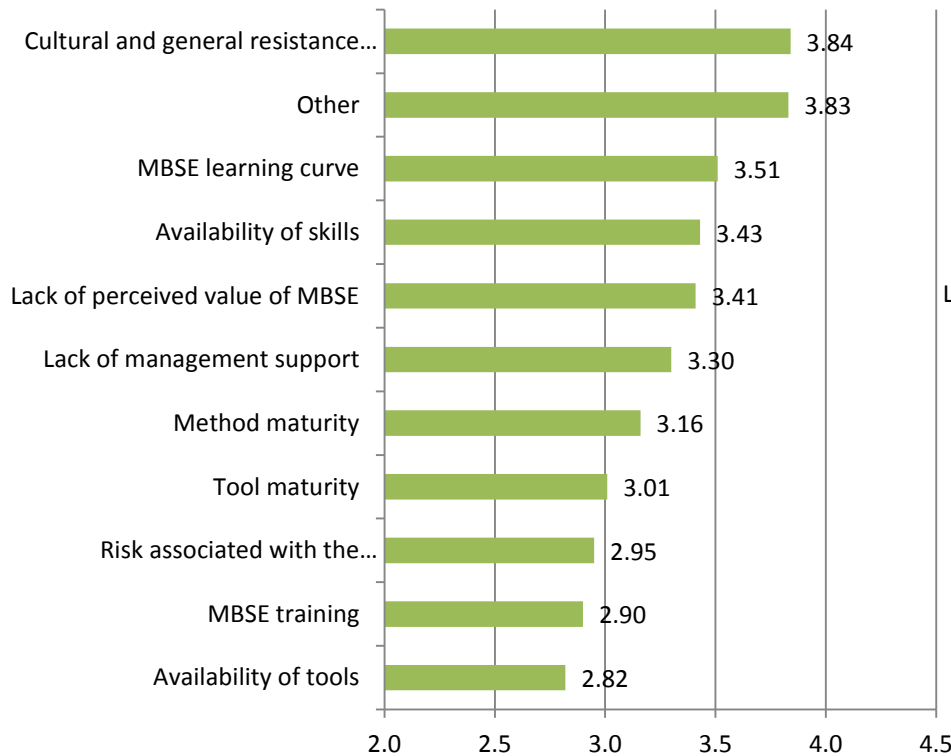
More than 1000 Engineers



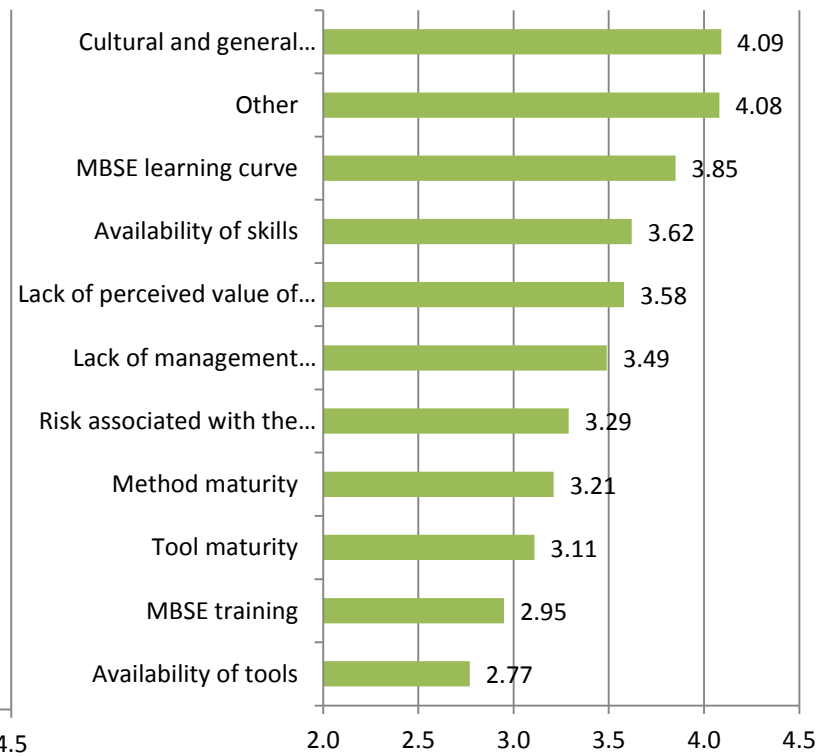
OBSERVATION: It does not appear that company size influences the perceived value as the numbers and ordering are almost identical. The only slight exception is that Project Management's perceived value is lower for the larger companies than small to medium size.

Question 9: Rank each item below in terms of the extent that it currently inhibits successful adoption of the MBSE within your organization/company.

1-1000 Engineers



More than 1000 Engineers



OBSERVATION: On average the smaller to medium size companies inhibitors appear to be less significant than larger companies.