2020 Additive Manufacturing Workshop

Breakout Session Survey Results

AM Part Risk Categorization

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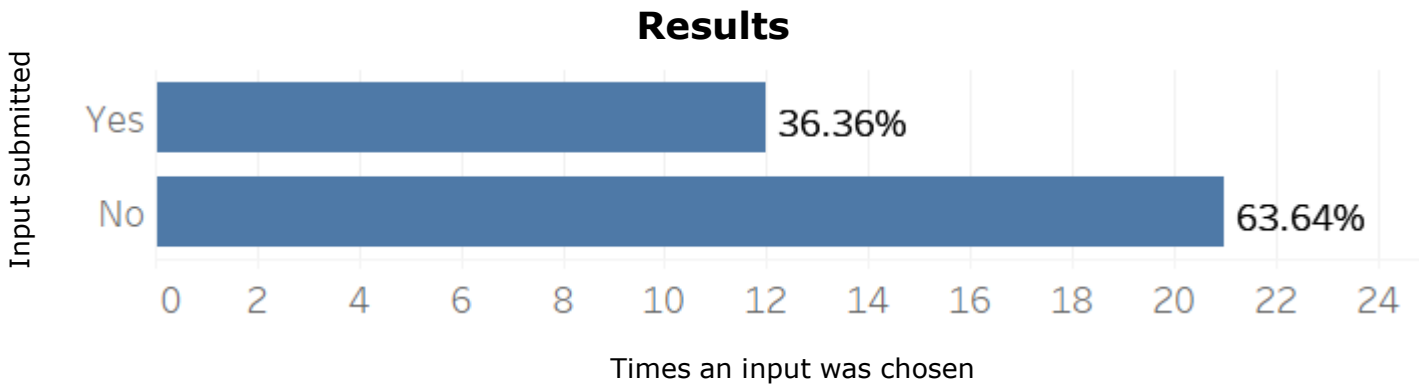
Andy Meighan
Tony Delgado

Criticality – Risk Discussion

Would criticality change when a traditionally manufactured part is substituted with an AM part?

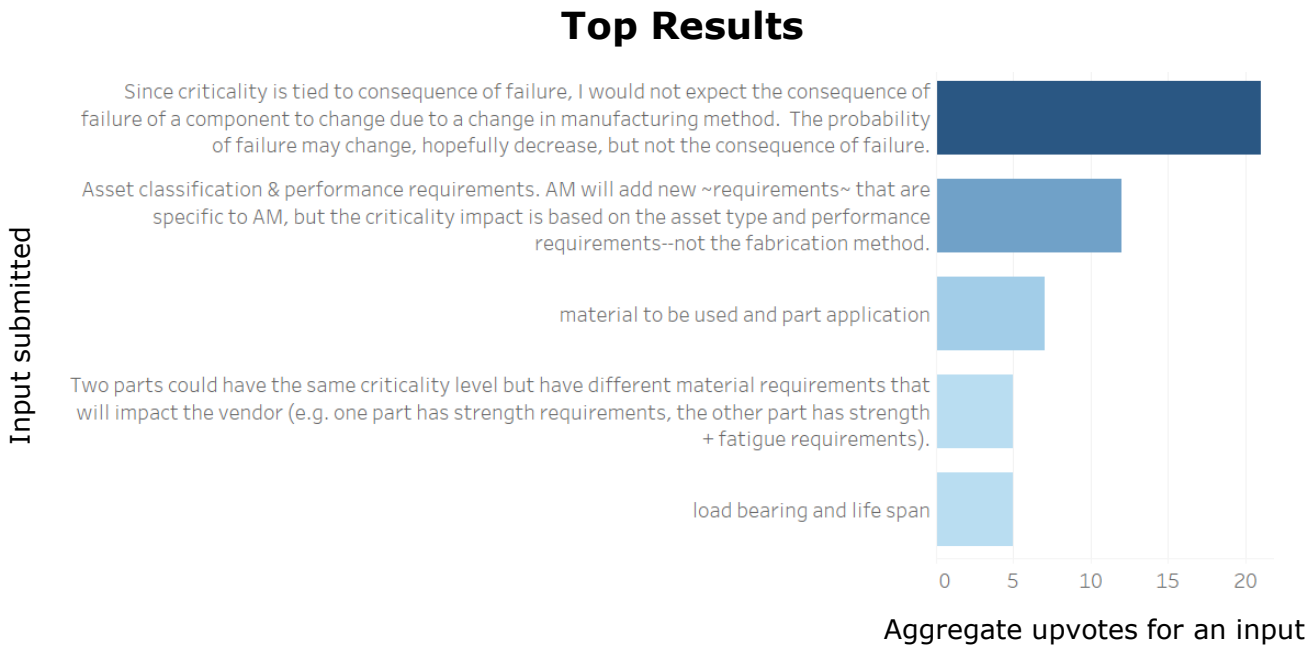


Survey Type: Multiple Choice **Number of Participants:** 33 **Unique Responses:** 33

Criticality – Risk Discussion

America Makes

How would you assess the impact to criticality when substituting an AM part?



Survey Type: Q&A **Number of Participants:** 24 **Unique Responses:** 26

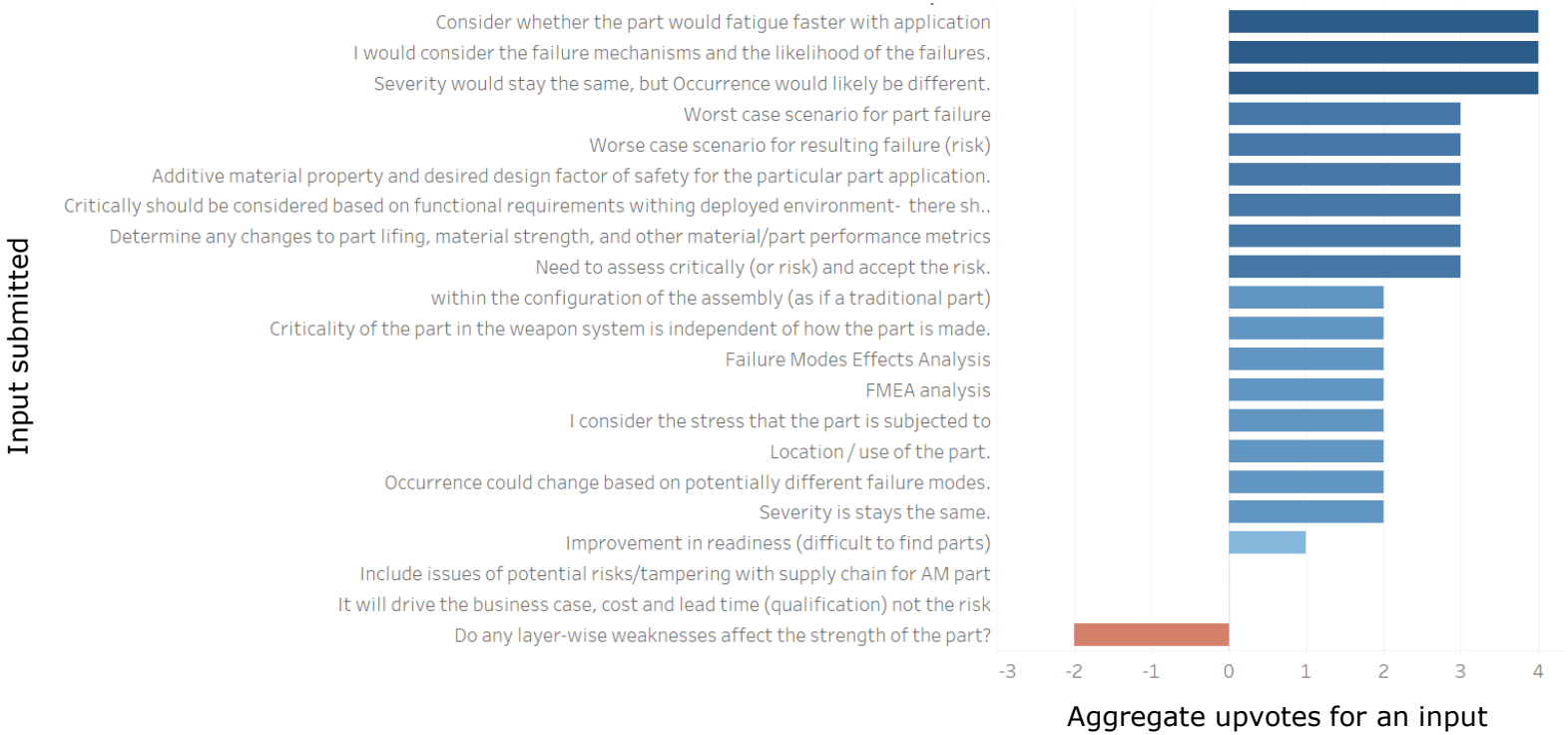
See the following slide for additional results

Criticality – Risk Discussion

America Makes

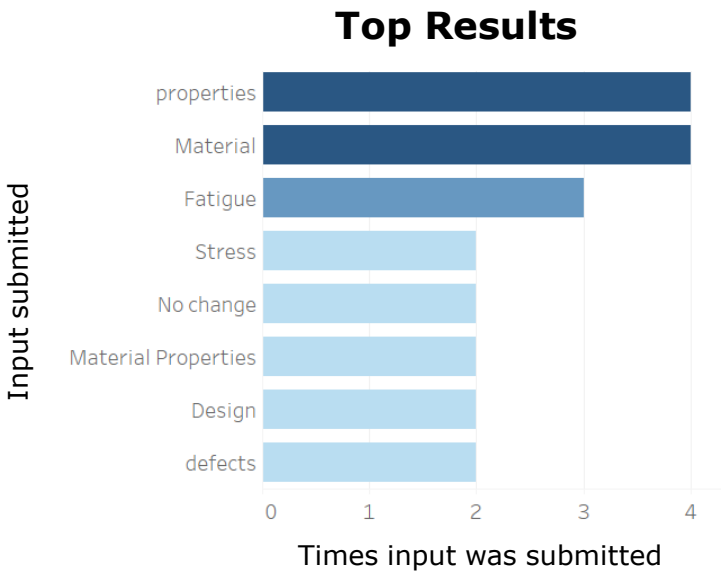
How would you assess the impact to criticality when substituting an AM part?

Additional Results



Criticality – Risk Discussion

When substituting an AM part, what parameters drive the change in criticality that need to be taken into consideration?



Survey Type: Open-ended **Number of Participants:** 27 **Unique Responses:** 53

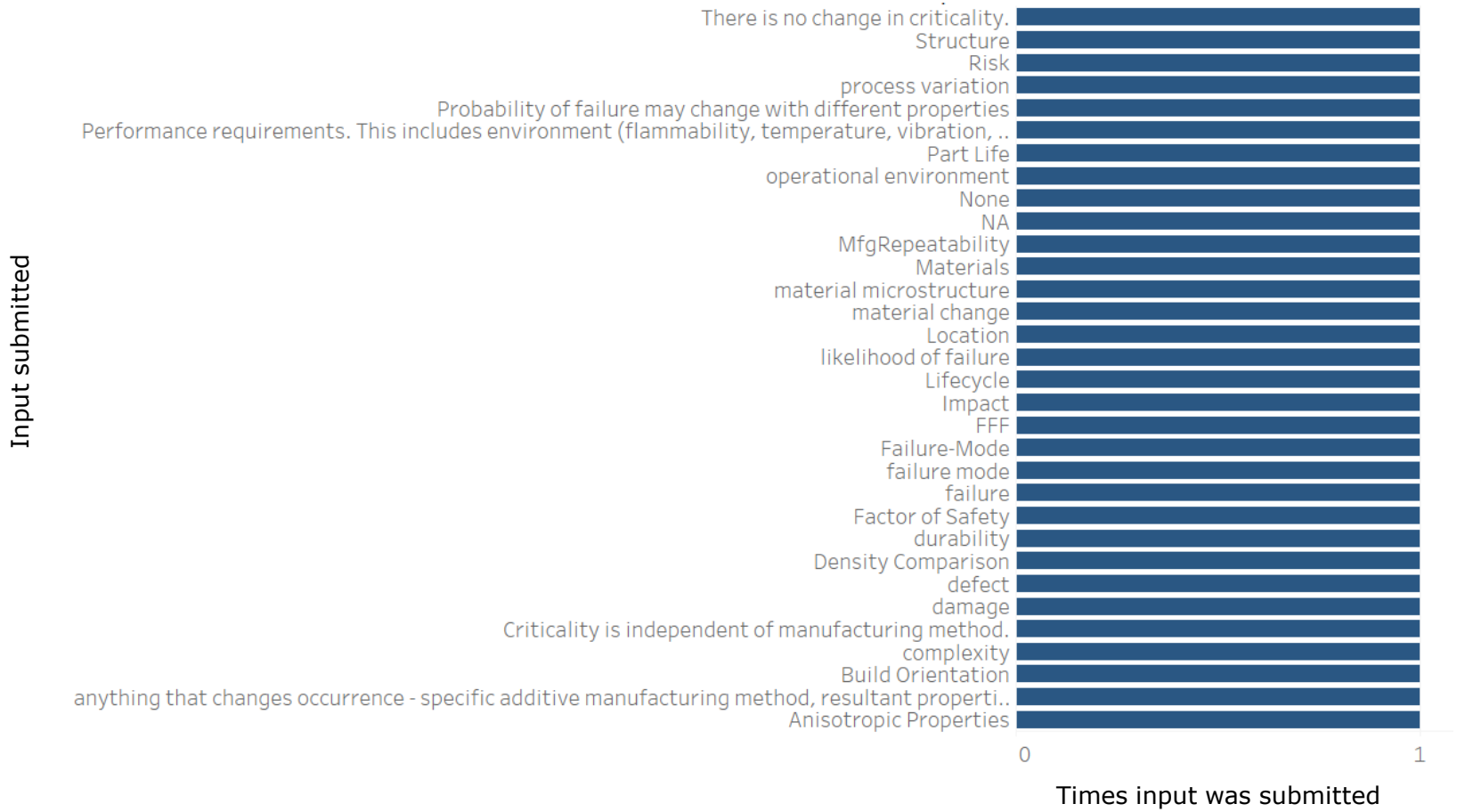
See the following slide for additional results

Criticality – Risk Discussion

America Makes

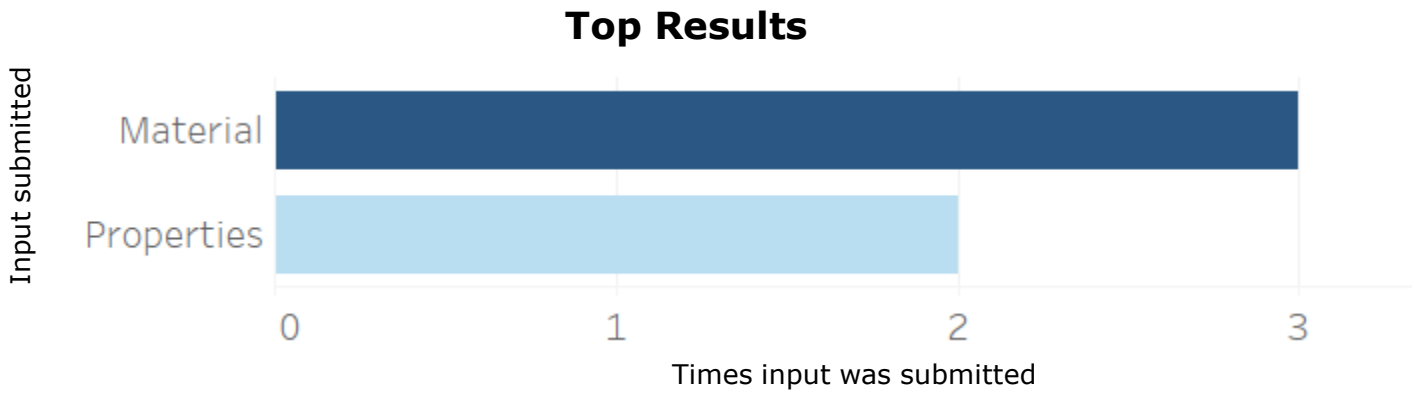
When substituting an AM part, what parameters drive the change in criticality that need to be taken into consideration?

Additional Results



Criticality - Occurrence

What factors affect the probability of failure when assessing the change in criticality due to substituting in an AM part?



Survey Type: Open-ended **Number of Participants:** 27 **Total Responses:** 47

See the following slide for additional results

Criticality - Occurrence

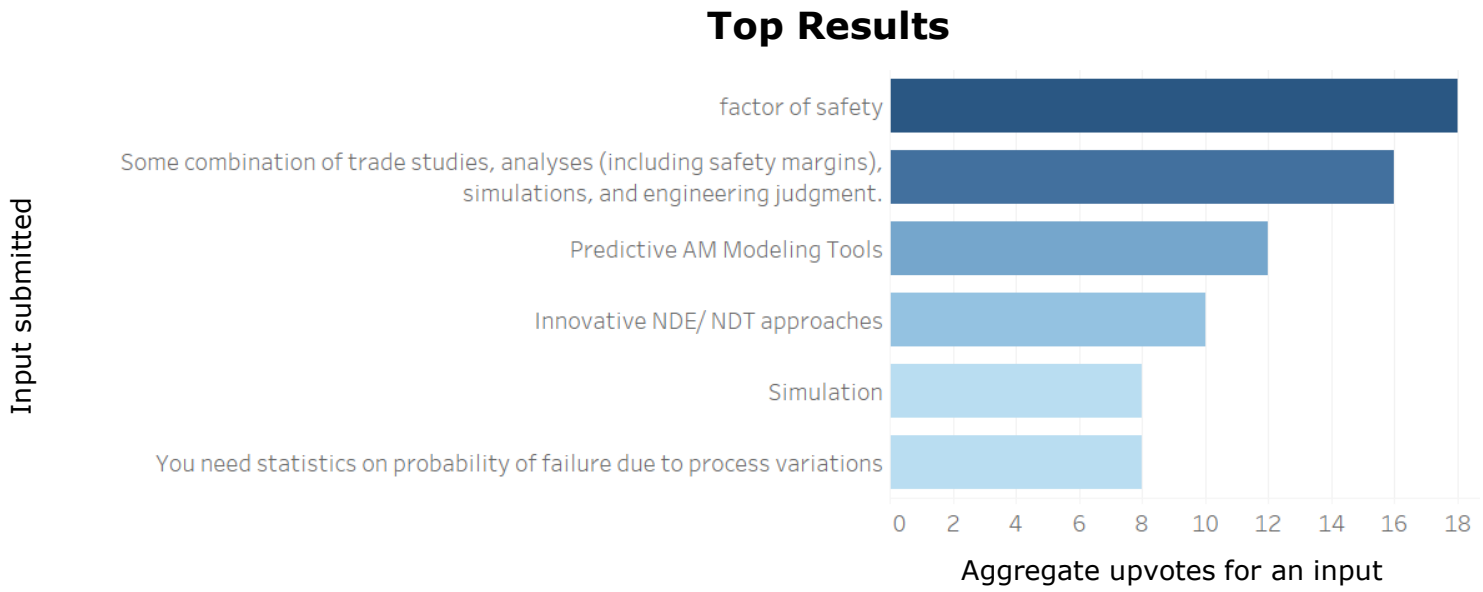
America Makes

What factors affect the probability of failure when assessing the change in criticality due to substituting in an AM part?

Additional Results

Criticality - Occurrence

How do you account for these factors when updating the probability of failure?



Survey Type: Q&A **Number of Participants:** 14 **Total Responses:** 20

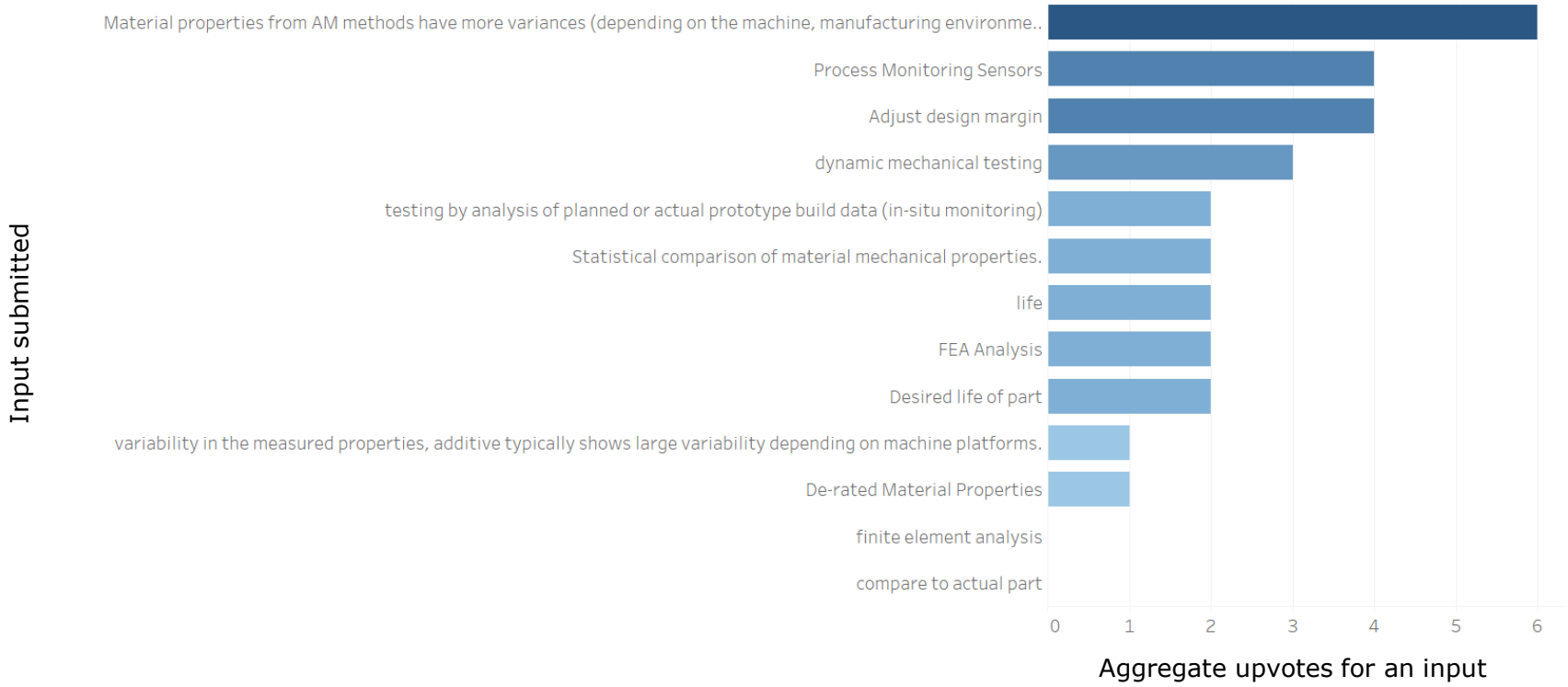
See the following slide for additional results

Criticality - Occurrence

America Makes

How do you account for these factors when updating the probability of failure?

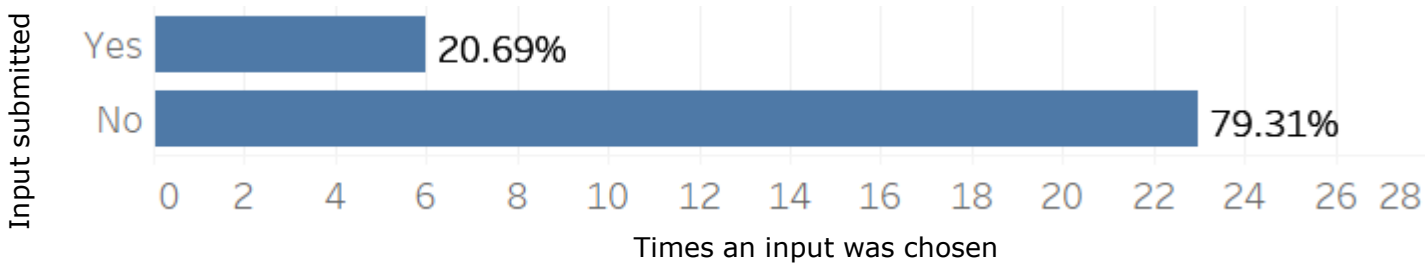
Additional Results



Criticality – Severity

Does the severity of a failure stay the same or change when a traditional part is substituted with an AM part? (Yes – changes; No – Stays the same)

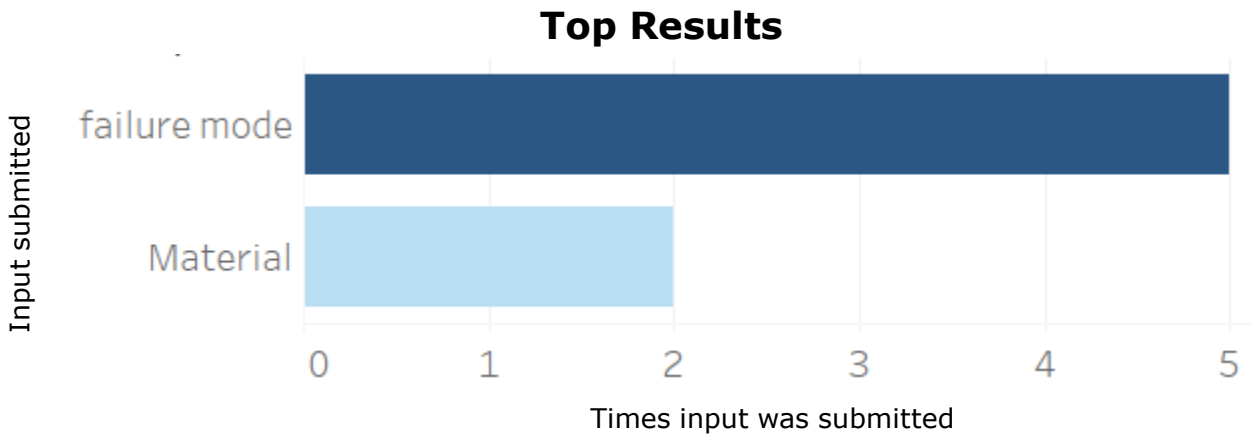
Results



Survey Type: Multiple Choice **Number of Participants:** 29 **Unique Responses:** 29

Criticality – Severity

If severity changes, what factors drive the change in severity?



Survey Type: Open-ended **Number of Participants:** 25 **Unique Responses:** 30

See the following slide for additional results

Criticality – Severity

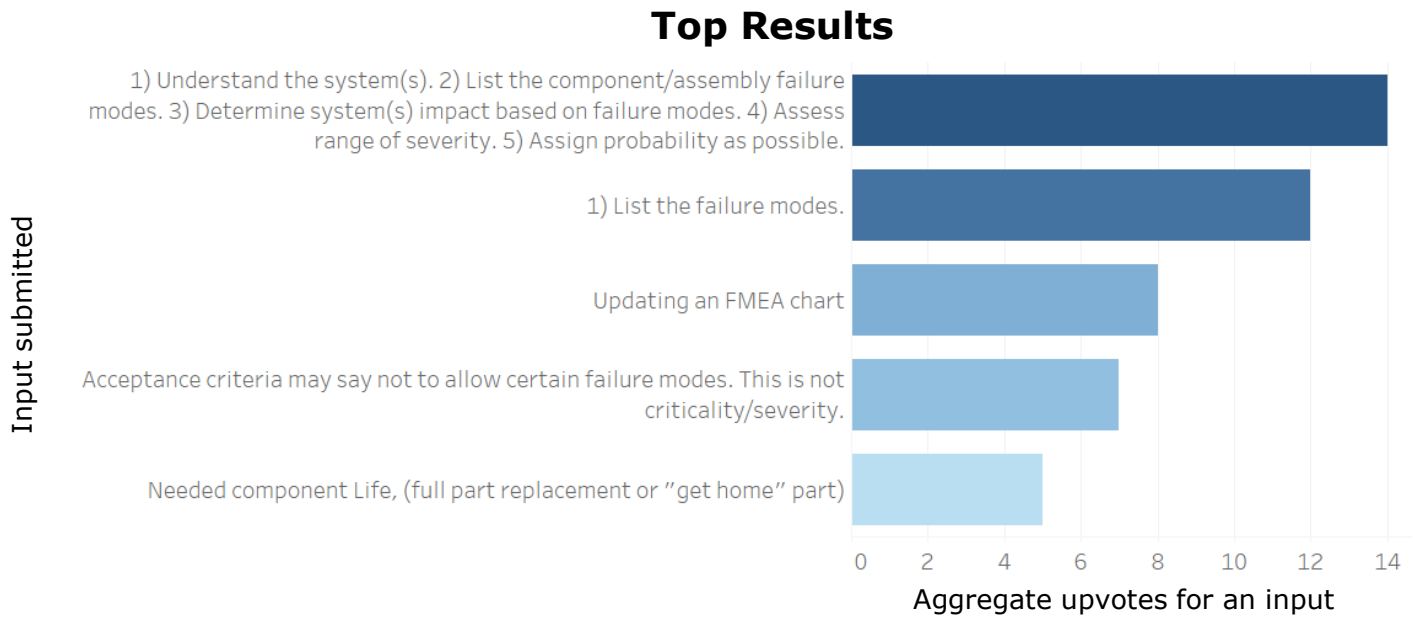
America Makes

If severity changes, what factors drive the change in severity?

Additional Results

Criticality – Severity

How do you account for those factors when updating the severity of failure?

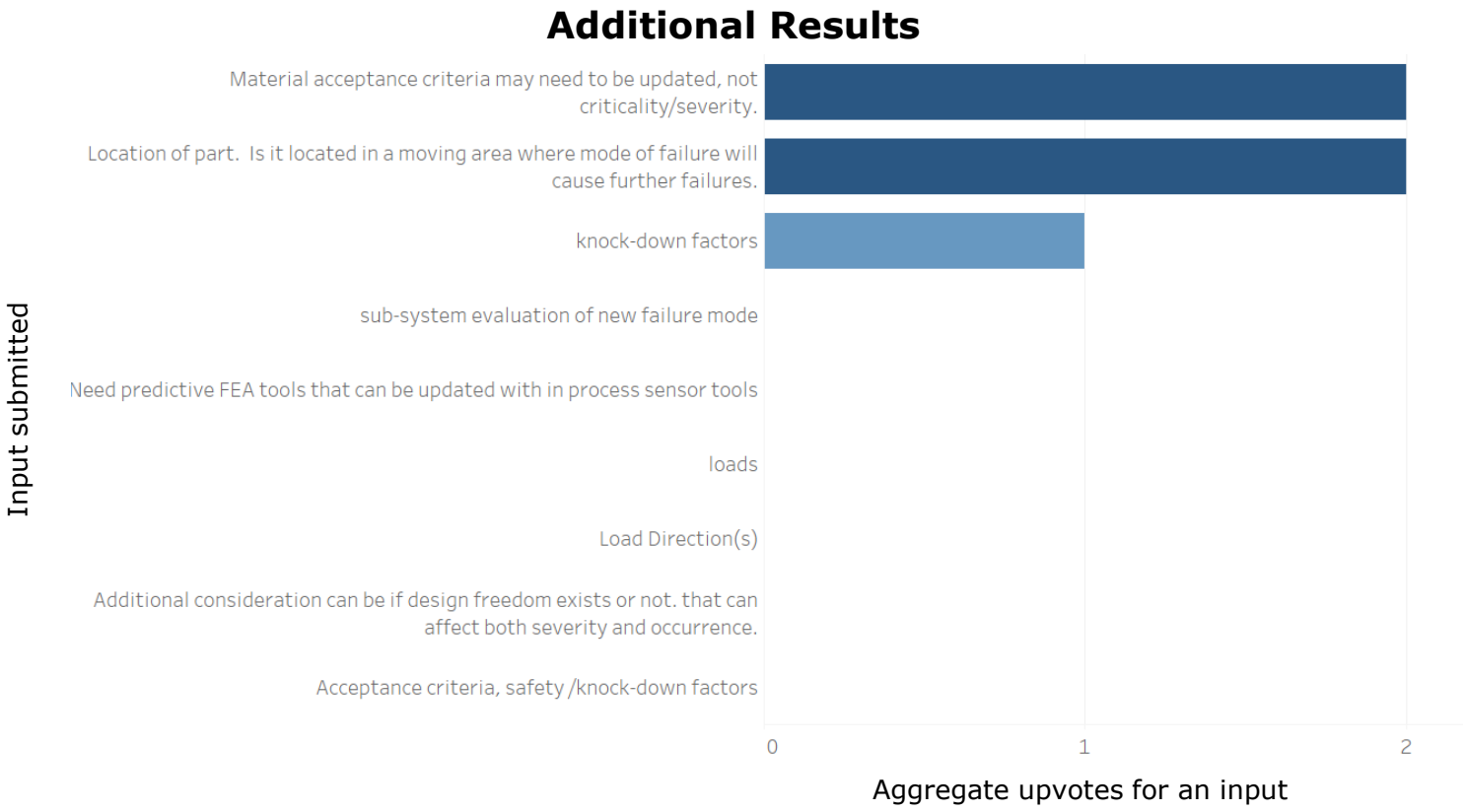


Survey Type: Q&A **Number of Participants:** 12 **Unique Responses:** 14

See the following slide for additional results

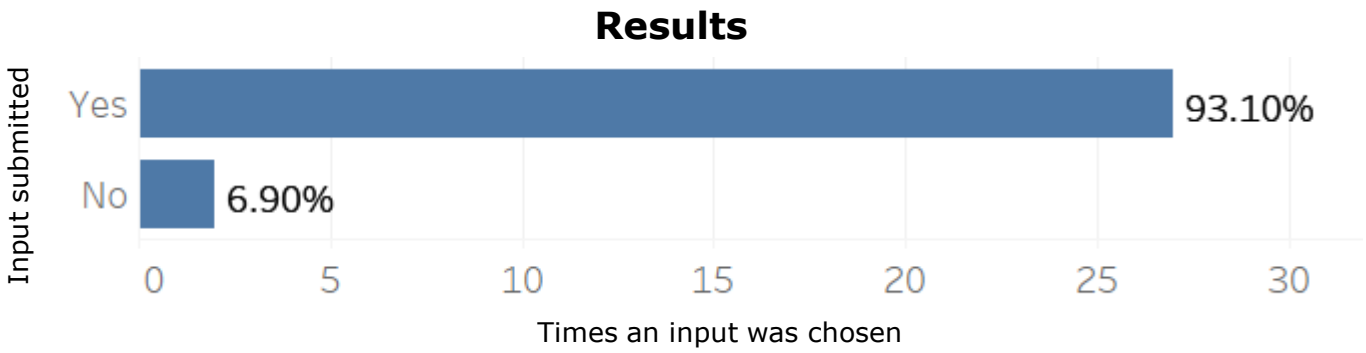
Criticality – Severity

How do you account for those factors when updating the severity of failure?



Criticality – Severity

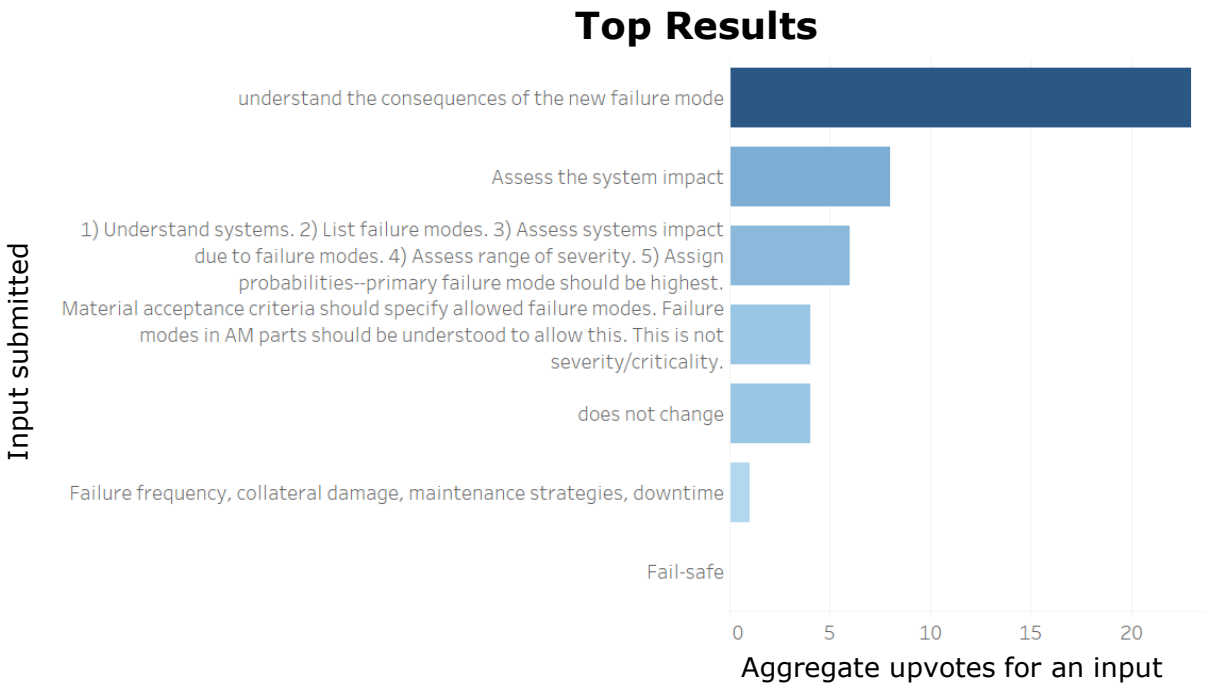
Should a change in severity be considered if the substitution with an AM part shifts the primary failure mode of the system?



Survey Type: Multiple Choice **Number of Participants:** 29 **Unique Responses:** 29

Criticality – Severity

How do you go about considering that change in severity when an AM part shifts the primary failure mode?



Survey Type: Q&A **Number of Participants:** 7 **Unique Responses:** 7

See the following slide for additional results

Theme – Technical Data

America Makes

Rank the current "Technical Data" Input in terms of importance for AM part production (Top-most important; Bottom-least important)

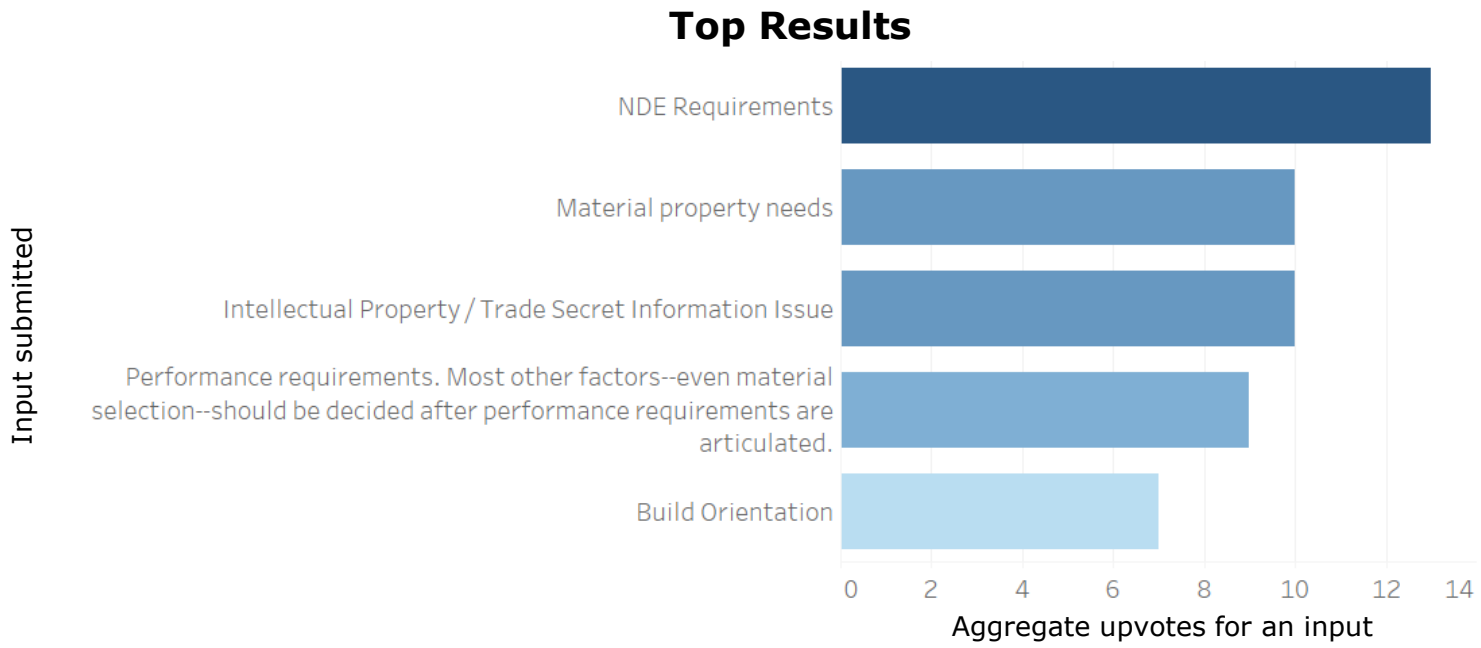
Rank	Input Provided
1	Material
2	Acceptance Criteria
3	Tightest Tolerance
4	Technical Data Package (TDP) Availability
5	Surface Quality and Features
6	Internal Geometries
7	Build Volume
8	Thinnest Wall
9	Past Process Requests
10	Mating Surface/Interfaces

Survey Type: Ranking **Number of Participants:** 19 **Unique Responses:** 19

Theme – Technical Data

America Makes

What Input should be added to the current "Technical Data" list?



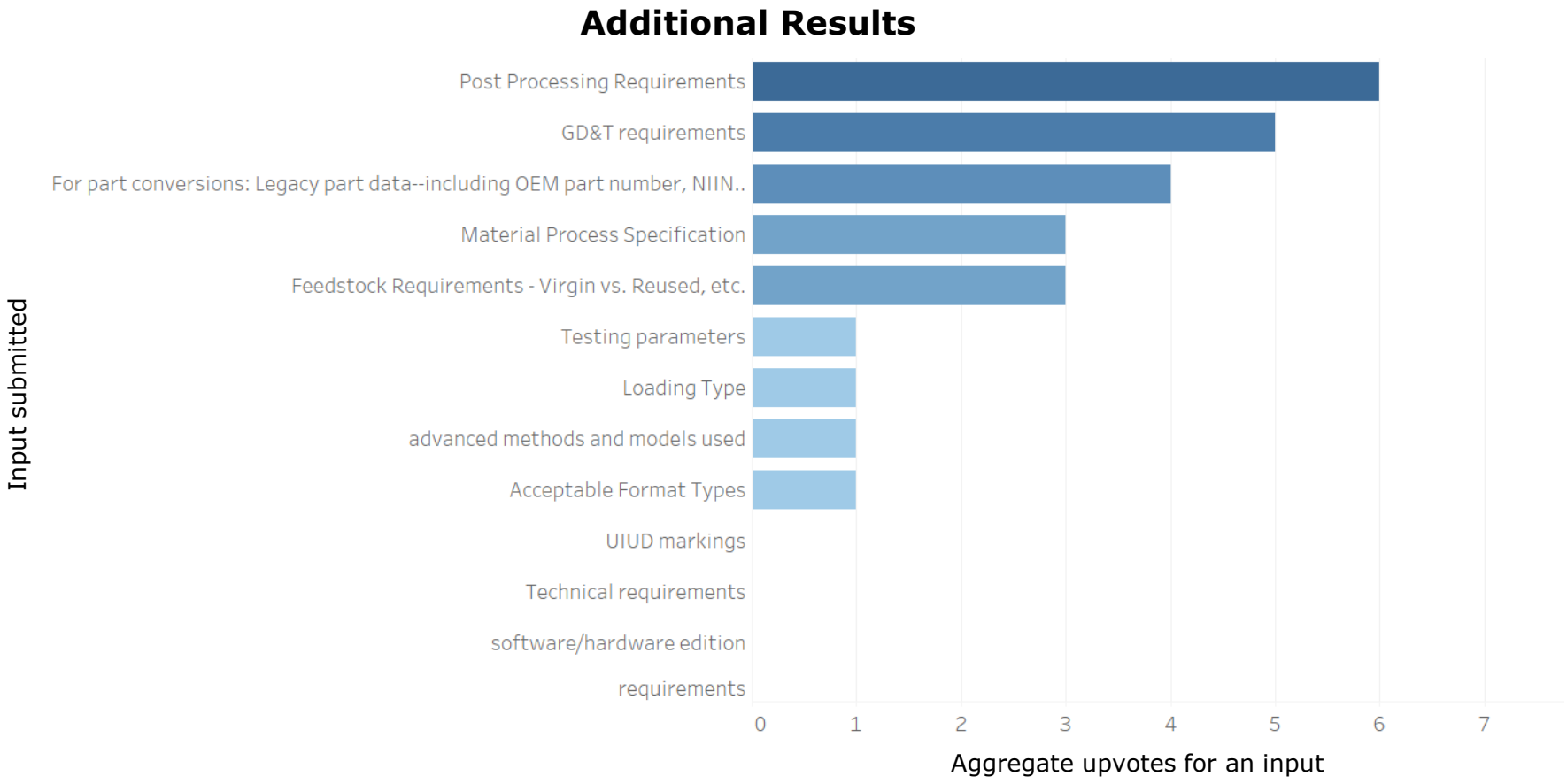
Survey Type: Q&A **Number of Participants:** 16 **Unique Responses:** 26

See the following slide for additional results

Theme – Technical Data

America Makes

What Input should be added to the current "Technical Data" list?



Theme – Supply Chain Data

America Makes

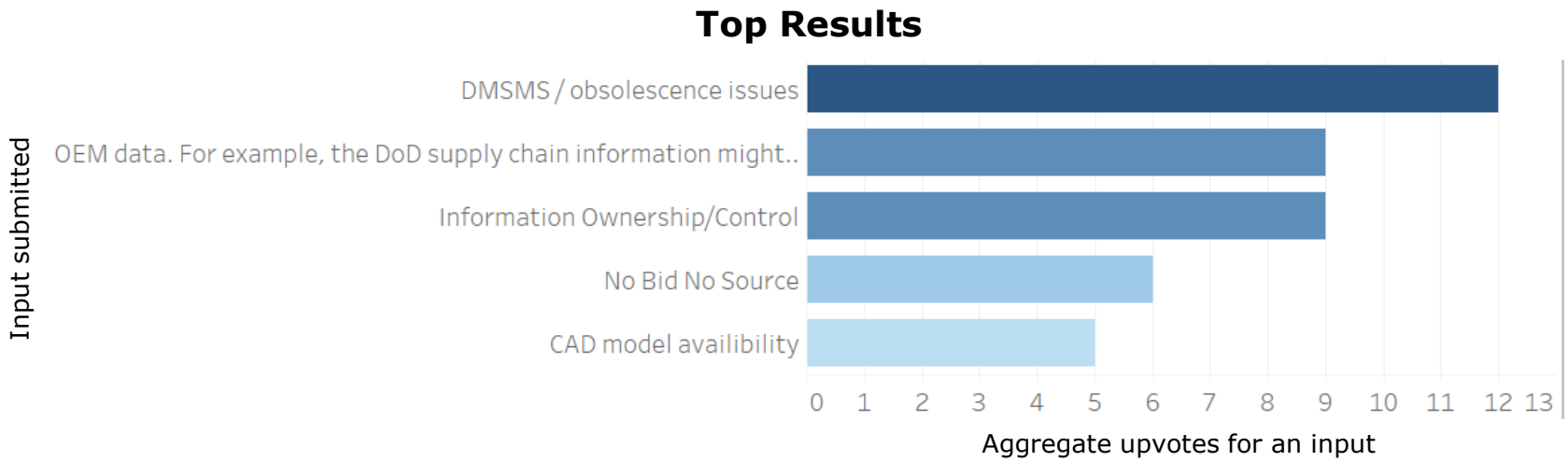
Rank the current "Supply Chain Data" Input in terms of importance for AM part production (Top-most important; Bottom-least important)

Rank	Input Provided
1	Readiness Degraders
2	Demand
3	Vendor Availability
4	Supply Issues
5	Traditional Lead Time
6	Additive Lead Time
7	Additive Part Cost
8	Traditional Part Cost
9	Time to Develop Additive Design
10	Part Savings
11	Unreasonable Price History
12	Purchase History
13	Quality History: Fleet Maintenance Data, Root Cause Corrective Action Data
14	Part Complexity

Survey Type: Ranking **Number of Participants:** 18 **Unique Responses:** 18

Theme – Supply Chain Data

What Input should be added to the current "Supply Chain Data" list?



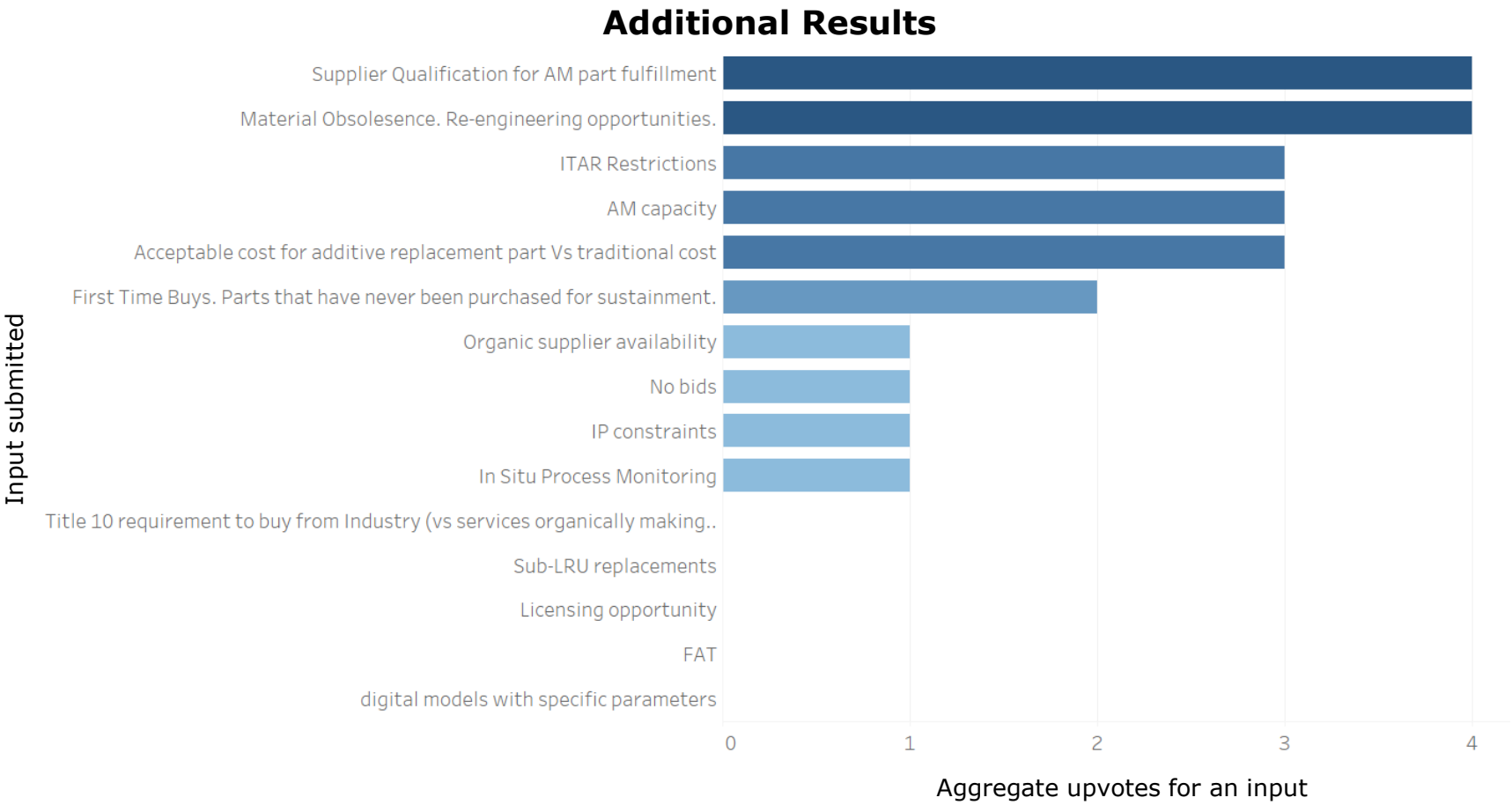
Survey Type: Q&A **Number of Participants:** 9 **Unique Responses:** 20

See the following slide for additional results

Theme – Supply Chain Data

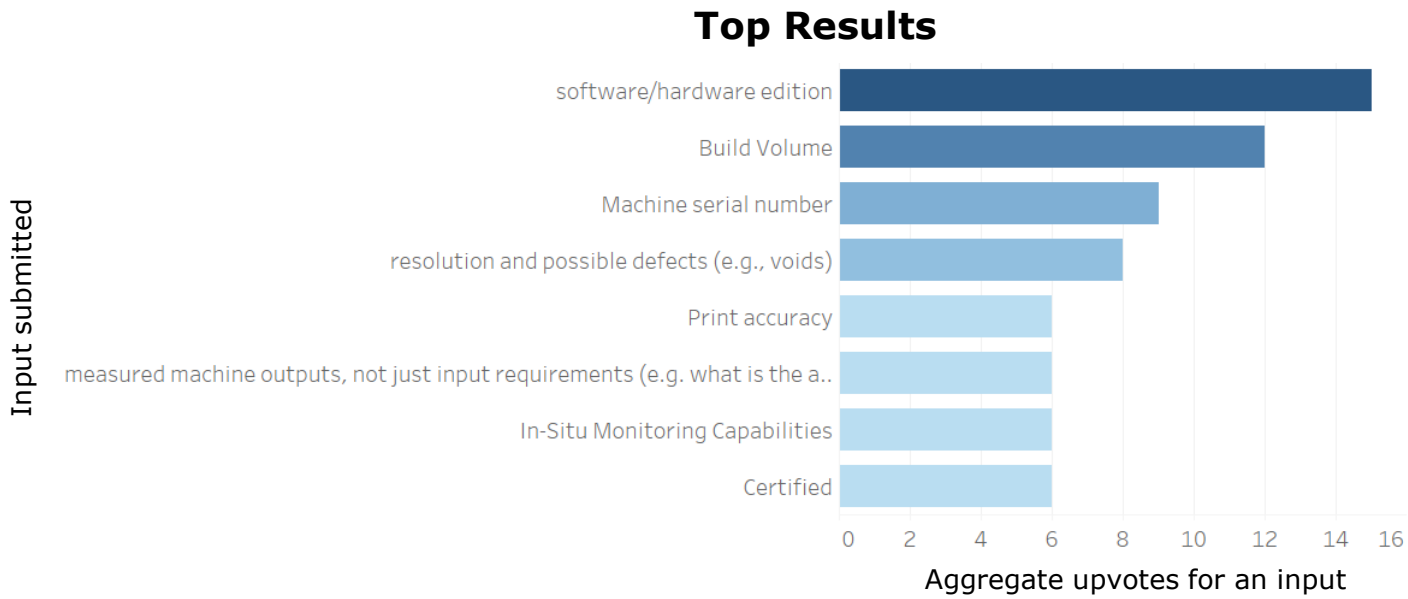
America Makes

What Input should be added to the current "Supply Chain Data" list?



Theme – Machine Data

What Input should be added to the current "Machine Data" list?



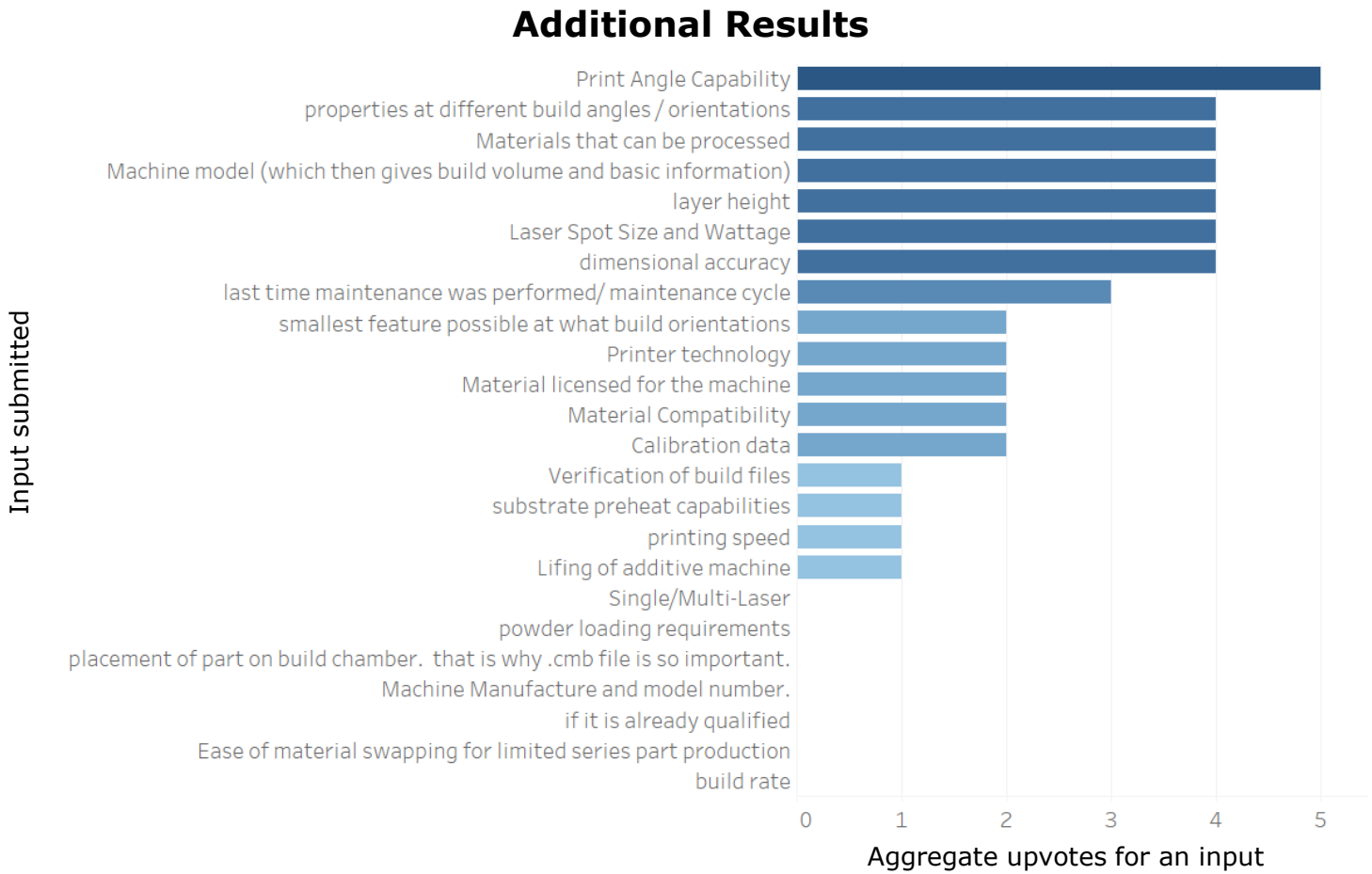
Survey Type: Q&A **Number of Participants:** 17 **Unique Responses:** 32

See the following slide for additional results

Theme – Machine Data

America Makes

What Input should be added to the current "Machine Data" list?



Theme – Need Identification Data

America Makes

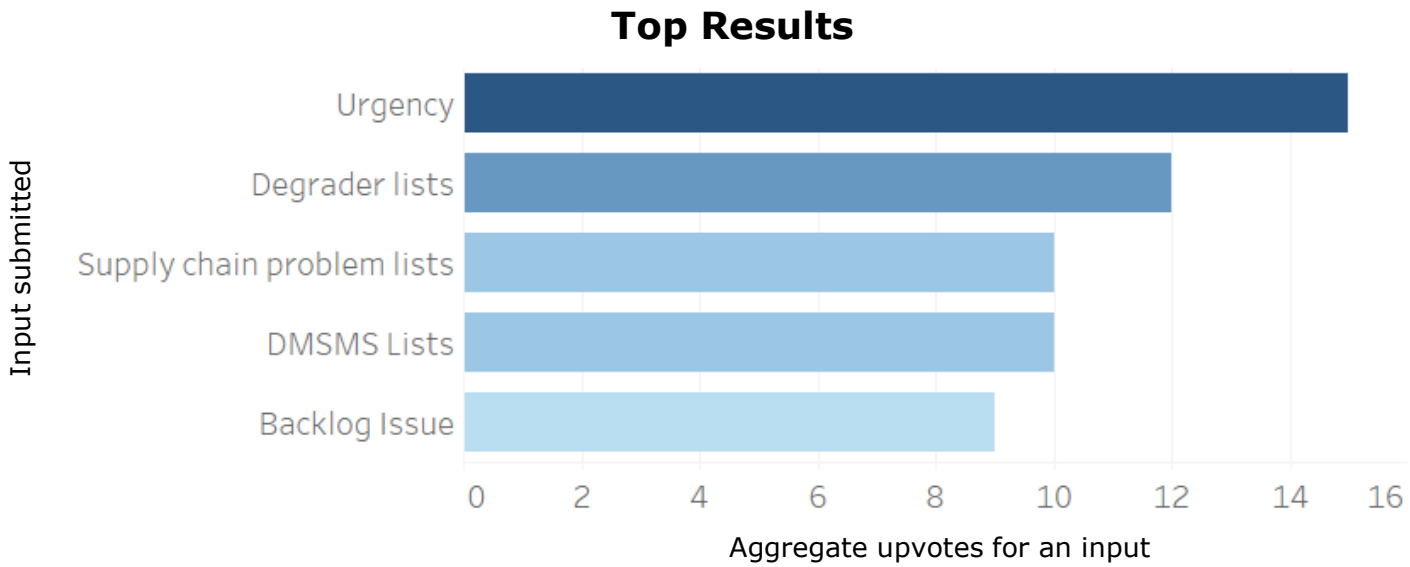
Rank the current "Need Identification" Input in terms of importance for AM part production (Top-most important; Bottom-least important)

Rank	Input Provided
1	Requests come from the fleet
2	Requests come from the customer
3	Requests come from the engineers
4	Requests come from program managers
5	Part screening/Rapid cost estimation tools
6	Developing tool with teaming partners (e.g., GT and Phillips)

Survey Type: Ranking **Number of Participants:** 25 **Unique Responses:** 25

Theme – Need Identification Data

What Input should be added to the current "Need Identification" list?

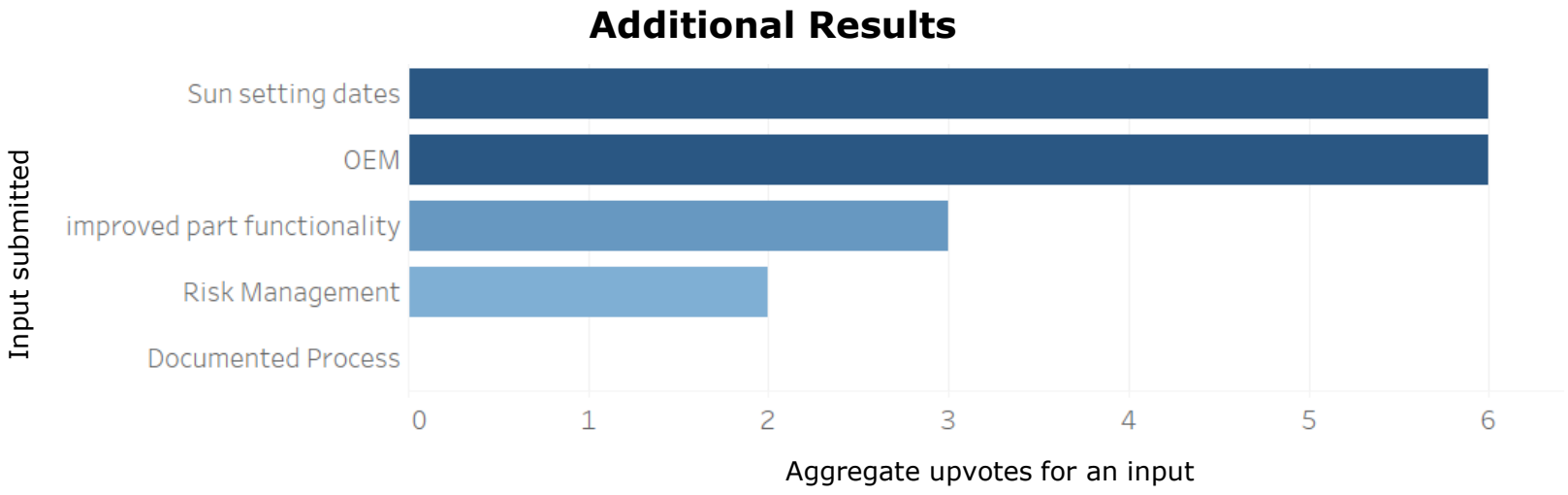


Survey Type: Q&A **Number of Participants:** 7 **Unique Responses:** 10

See the following slide for additional results

Theme – Need Identification Data

What Input should be added to the current "Need Identification" list?



Theme – Legal Data

America Makes

Rank the current "Legal" Input in terms of importance for AM part production (Top-most important; Bottom-least important)

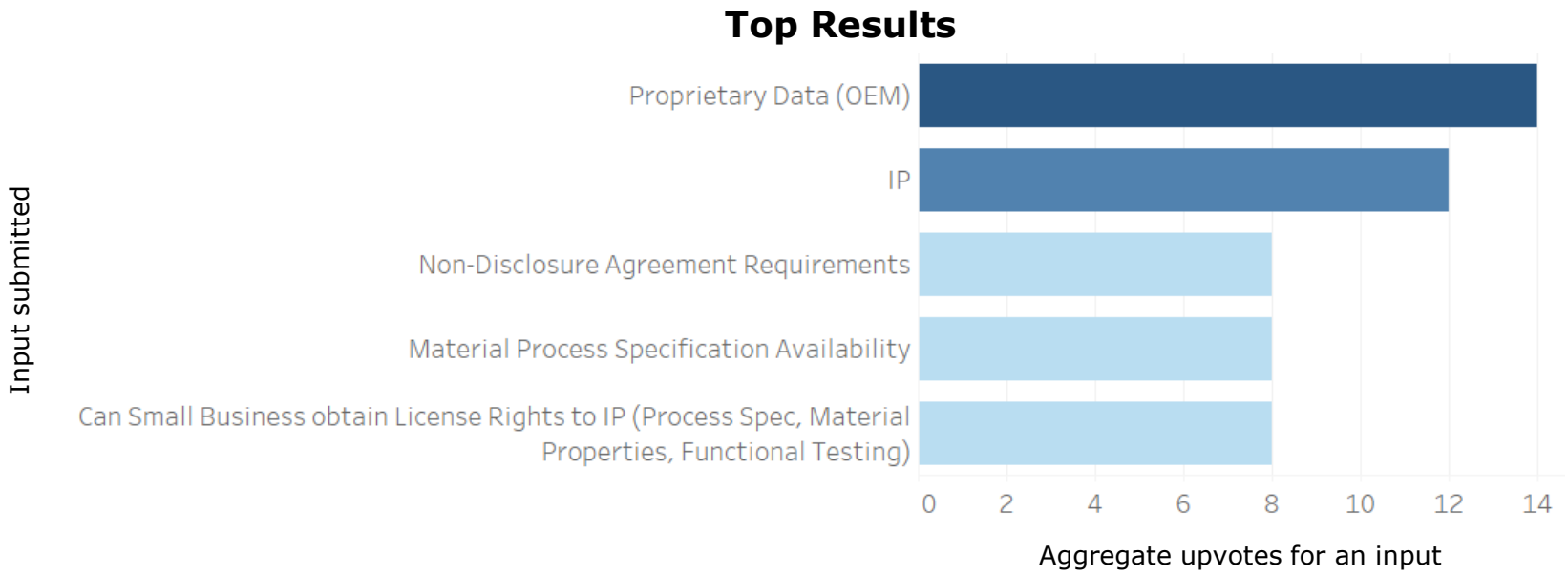
Rank	Input Provided
1	Data/license rights marking on existing tech drawing (part manufacturing)
2	Export Control
3	Patent marking on part (reverse engineering)
4	Trademark marking on part (reverse engineering)
5	Acquisition Method Code (AMC)
6	Small/disadvantaged business: meet specific design/material/manufacturing process qualification requirements

Survey Type: Ranking **Number of Participants:** 20 **Unique Responses:** 20

Theme – Legal Data

America Makes

What Input should be added to the current "Legal" list?



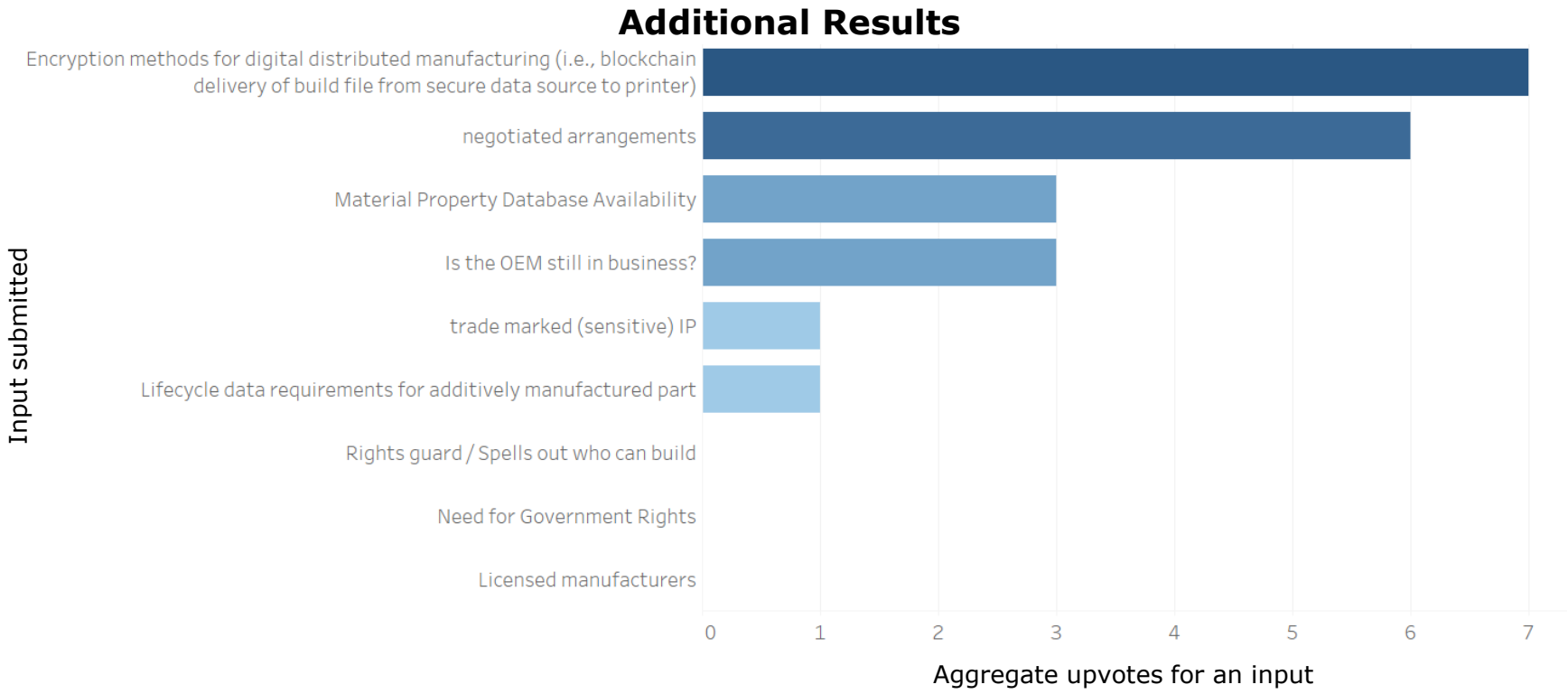
Survey Type: Q&A **Number of Participants:** 9 **Unique Responses:** 14

See the following slide for additional results

Theme – Legal Data

America Makes

What Input should be added to the current "Legal" list?



Theme – Application Data

Rank the current "Application Data" Input in terms of importance for AM part production (Top-most important; Bottom-least important)

Top Results

Rank	Input Provided
1	Criticality
2	Airworthiness
3	Fatigue Critical
4	CSI: Critical Safety Items
5	Essentiality

Survey Type: Ranking **Number of Participants:** 20 **Unique Responses:** 20

See the following slide for additional results

Theme – Application Data

America Makes

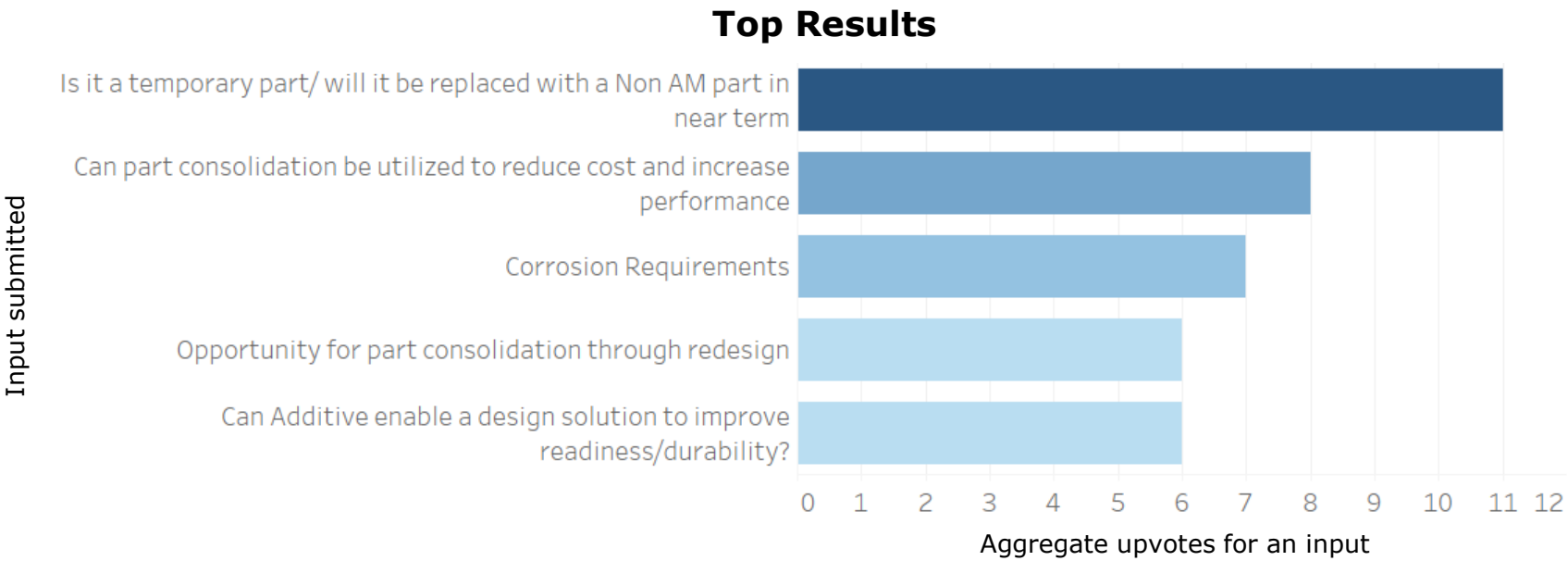
Rank the current "Application Data" Input in terms of importance for AM part production (Top-most important; Bottom-least important)

Rank	Input Provided
6	Thermal Critical
7	CAI: Critical Application Items
8	Structural
9	Material Type/ Characteristics
10	Severity
11	Rotating Part
12	Environmental Damage
13	Weapon System
14	Equipment Damage
15	Vehicle/Ground Equipment
16	Aerospace
17	Probability
18	SMR Codes
19	NC: Not Critical
20	Tooling/Jigs/Fixtures
21	Nuclear Hard/Unknown

Theme – Application Data

America Makes

What Input should be added to the current "Application Data" list?



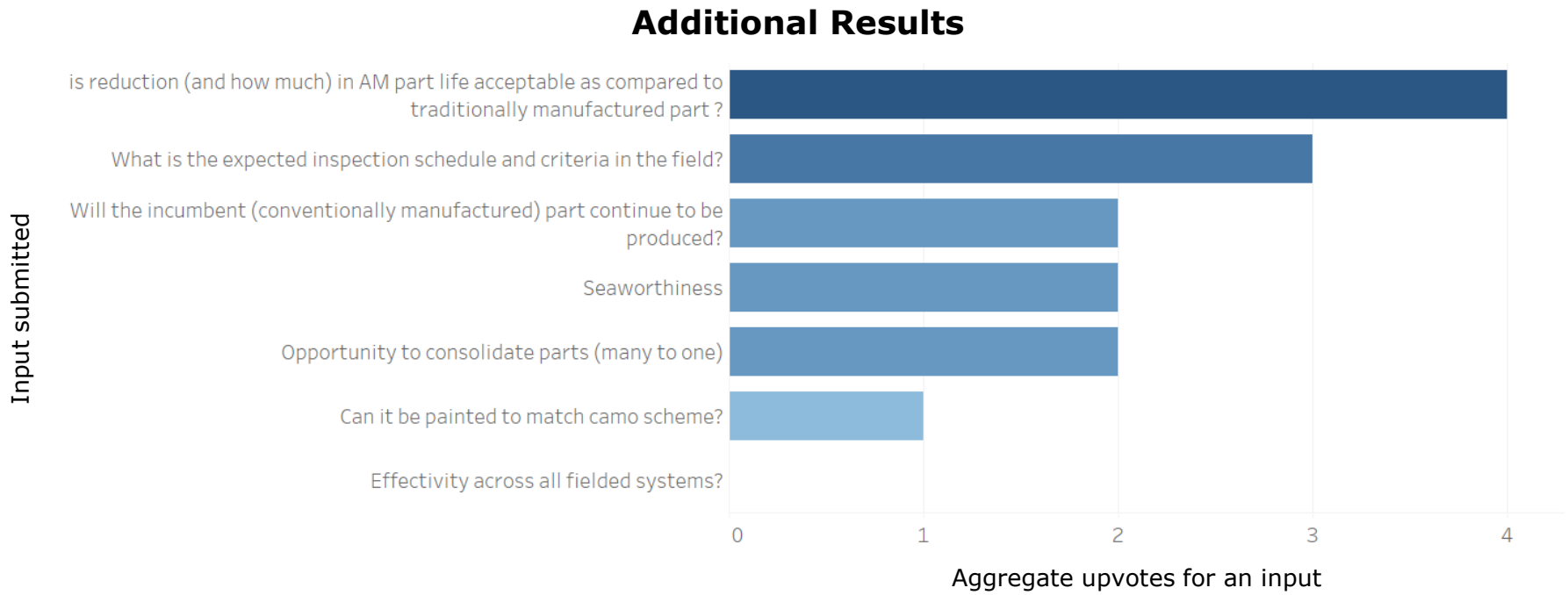
Survey Type: Q&A **Number of Participants:** 10 **Unique Responses:** 12

See the following slide for additional results

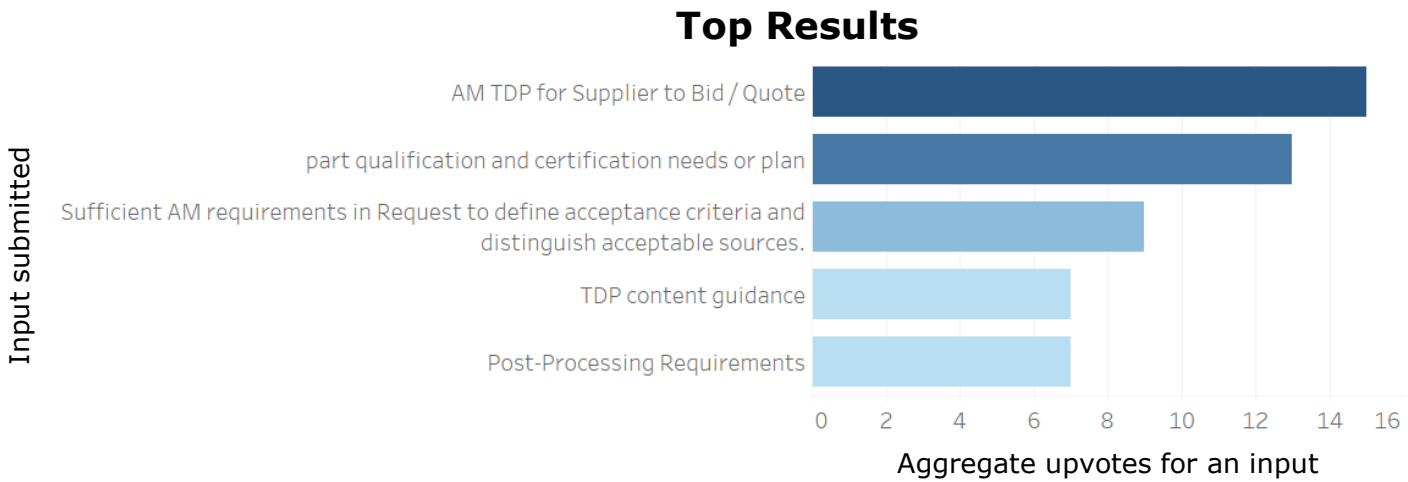
Theme – Application Data

America Makes

What Input should be added to the current "Application Data" list?



What "topics" should be considered under "AM Part Sourcing Requests"?



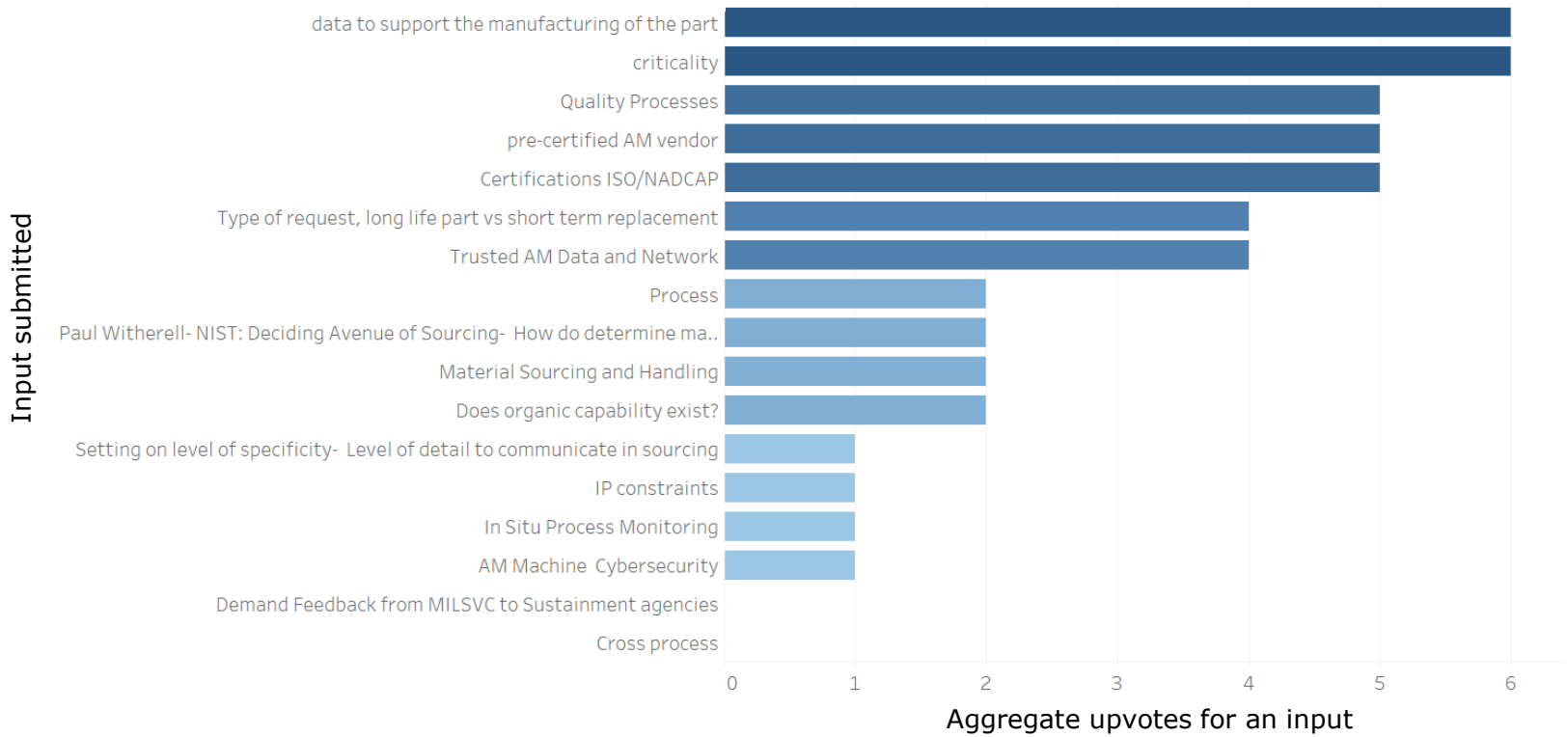
Survey Type: Q&A **Number of Participants:** 13 **Unique Responses:** 22

See the following slide for additional results

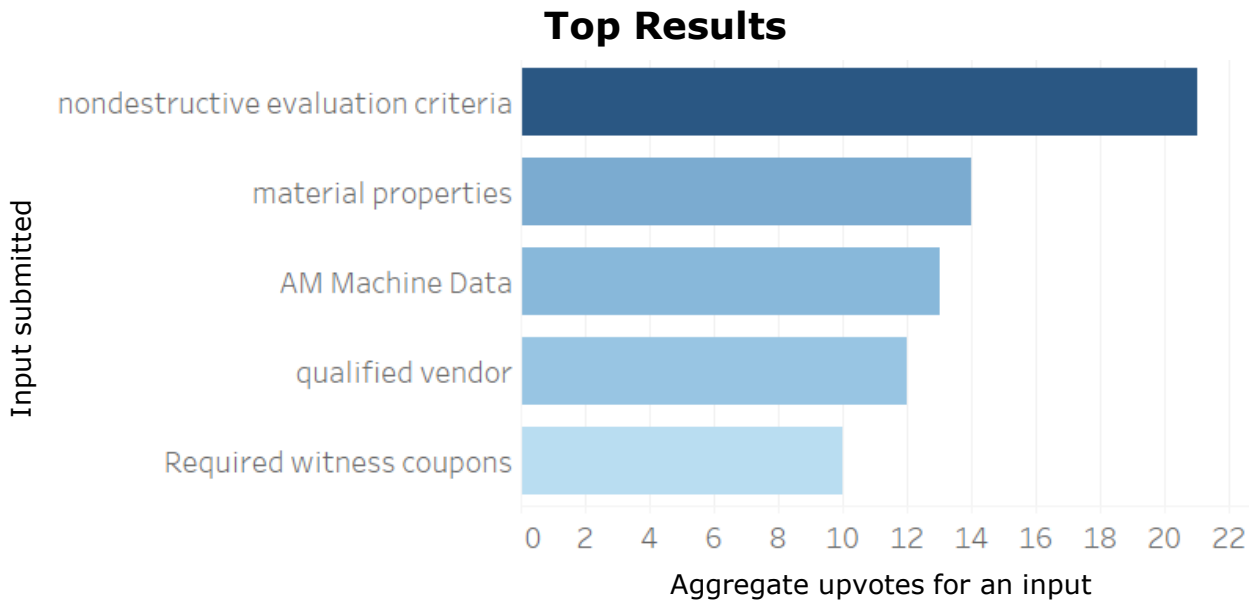
America Makes

What "topics" should be considered under "AM Part Sourcing Requests"?

Additional Results



What "topics" should be considered under "AM Part acceptance criteria "?



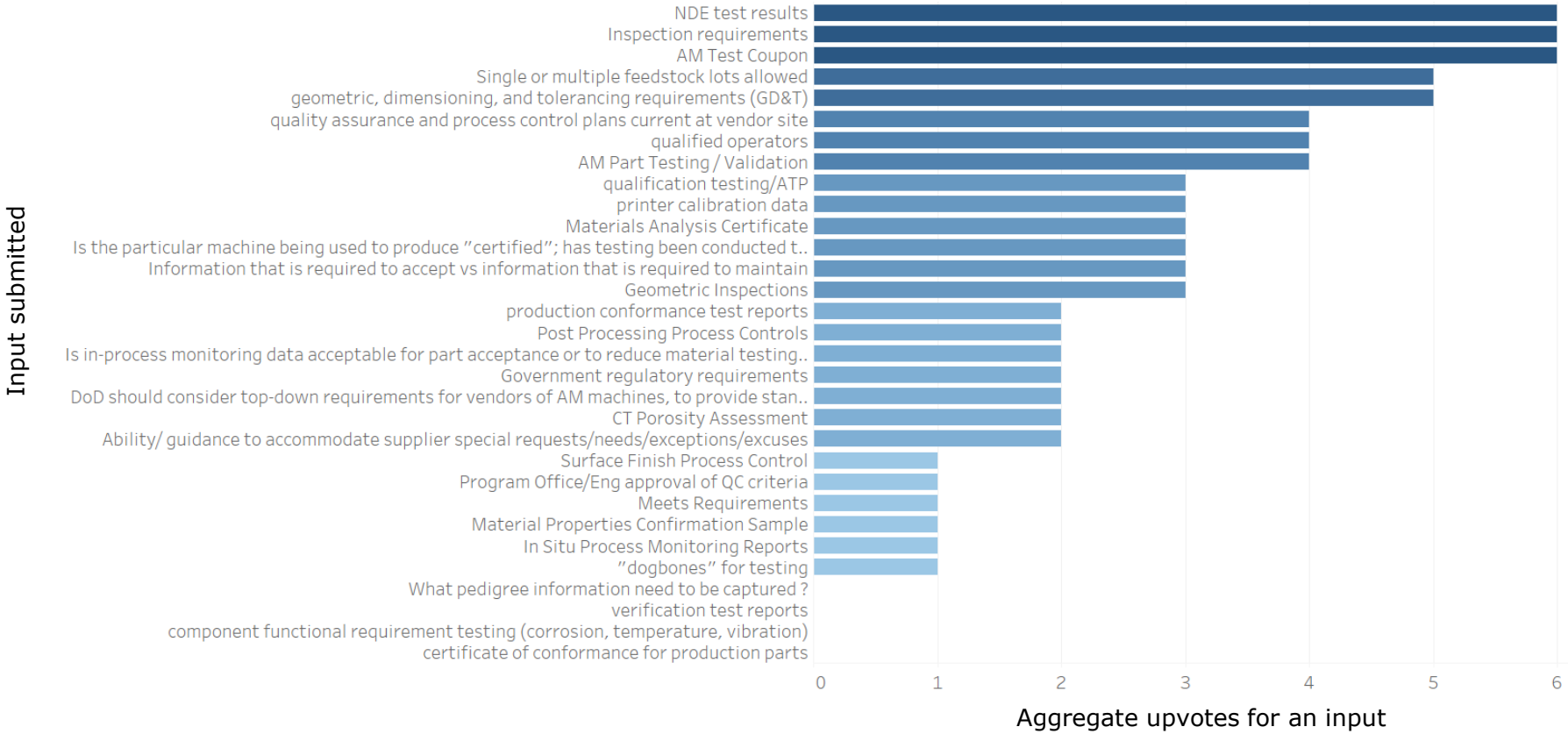
Survey Type: Q&A **Number of Participants:** 14 **Unique Responses:** 36

See the following slide for additional results

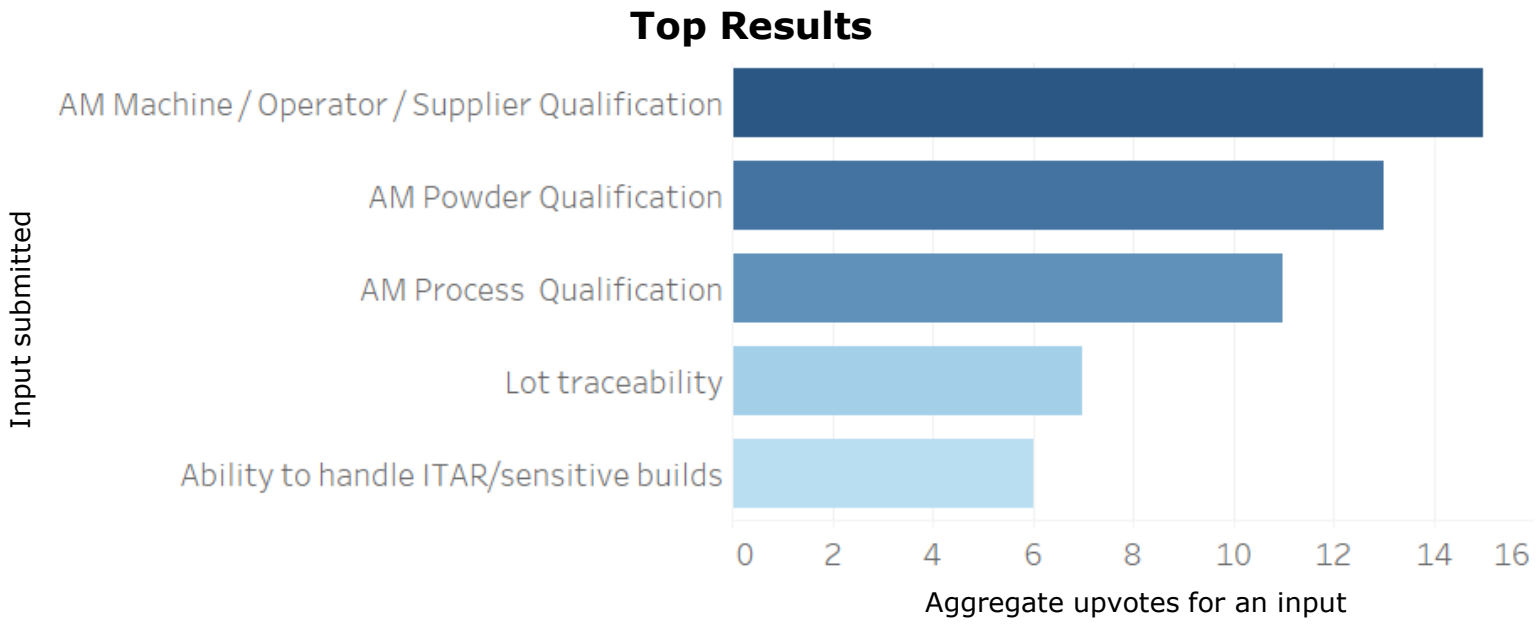
America Makes

What "topics" should be considered under "AM Part acceptance criteria "?

Additional Results

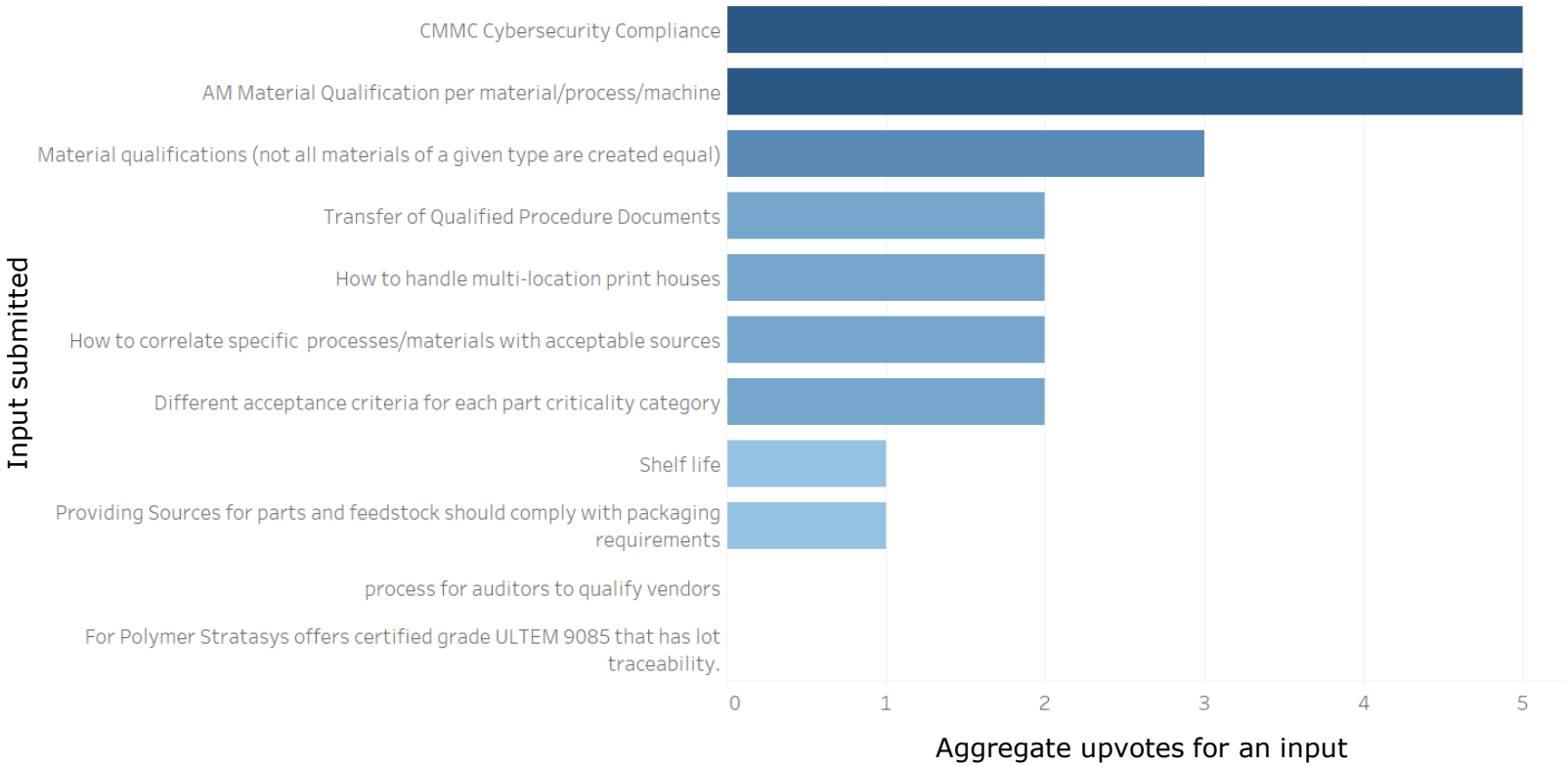


What "topics" should be considered under "AM acceptable sources listings for delivered AM parts and feedstock"?



Survey Type: Q&A **Number of Participants:** 10 **Unique Responses:** 16

See the following slide for additional results

What "topics" should be considered under "AM acceptable sources listings for delivered AM parts and feedstock"?

Additional Results