SEMI Supply Chain Survey

Benchmark your supply chain agility

June 2024

SCM SUPPLY CHAIN MANAGEMENT

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SEMI SCM Events at SEMICON West 2024

Wednesday, Jul 10 2:20pm – 3:20pm PDT	Beyond Tier Mapping - Creating a Robust and Resilient Supply Chain Risk Management Program Location: Keynote Stage, North Hall, Room 24
Thursday, Jul 11 10:30am – 1:00pm PDT	Foundations for a Resilient and Agile Supply Chain Location: Moscone South, Exhibition Level Room 8

Panel Moderator: Bettina Weiss - SEMI
Panelists: Kannan Perumal - Applied Materials
Helmer Fredrich - EMD Electronics
Roger Kao - GlobalFoundries
Ben Fullmer - Intel
Boris Metodiev - TechInsights

10:30am – 10:40am PDT	Introductions Session Moderator (SMfg): Krish Dharma – SEMI
10:40am – 11:10am PDT	SEMI-McKinsey | 2024 Semiconductor Supply Chain Survey Results Speaker (SMfG): Henry Marcil – McKinsey & Company Speaker (SMfG): Kushal Jolapara – McKinsey & Company
11:10am – 11:40am PDT	Supply Chain Resilience: Practical Approaches to Creating Business Value
11:40am – 12:00pm PDT	Power your Supply Chain for Resilience, Agility, and Speed with AI and Automation Speaker (SMfG): Grant Bodley – UiPath

11:40am – 12:00pm PDT	Power your Supply Chain for Resilience, Agility, and Speed with AI and Automation Speaker (SMfG): Grant Bodley – UiPath
12:00pm – 12:20pm PDT	A Strategic Semi-focused Supply Chain Digital Twin for End-to-End Transparency Speaker (SMfG): Chris Han-adebekun – Athinia Technology Speaker (SMfG): Lita Shon-Roy – TECHCET
12:20pm – 12:40pm PDT	Supply Chain versus Supply Net - mapping the metaphor for resilience Speaker (SMfG): Urmi Sen – Siemens Digital Industries Software

Very nice to meet you all

Henry Marcil
Partner
San Francisco

Leader in McKinsey’s Advanced Industries Practice, focused on semiconductor and key end markets (e.g., aerospace, high tech)

Leads McKinsey’s Resiliency and Geopolitics service line in Semiconductor

Kushal Jolapara
Engagement Manager
Chicago

Manager in McKinsey's Operations practice, with a focus on product development and procurement service lines

Leads Supply Chain studies for Advanced Industries clients including Aerospace, Auto and Semiconductors

Jakob Münch
Engagement Manager
Berlin

Manager in McKinsey’s Advanced Industries Practice, focused on semiconductor clients along the value chain

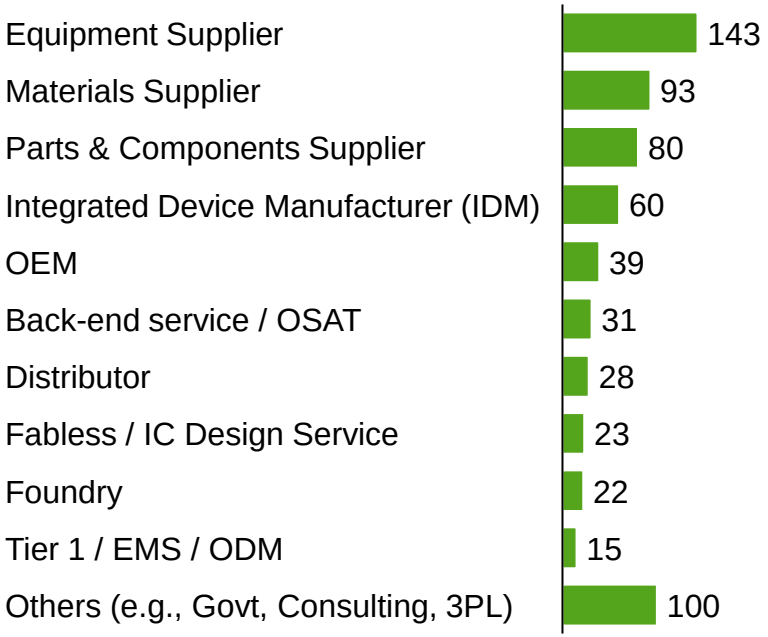
Leads Strategy & Operations projects at Foundries, IDMs, and End market clients

Introduction to the SEMI Global Semiconductor Supply Chain Survey

The 2024 Supply Chain Survey measured the operational “health” of the semiconductor supply chain. There were a record ~600 respondents this year, compared to last year’s ~200 respondents

Who participated?

Number of respondents



What devices and supply categories were covered?

Devices

- Analog IC
- Discretes
- Logic
- Memory
- Microcomponents
- Optical Sensors & Actuators

Supply

- Assembly
- Chemicals & Solids
- Flat Panel Display
- Frontend
- Gases
- Mask Making
- Nanotechnology
- Photovoltaic
- Process
- Substrate
- Test

What were the focus areas?

- Demand update
- Demand and supply visibility
- Forecasting visibility
- Inventory update
- Long Term Agreements (LTA)
- Production utilization
- Risks and opportunities
- Supply lead times
- Supplier commits

"Roadmap" for the SEMI Supply Chain survey

A B C

Supply

Lead times

- A1 ICs
- A2 Materials
- A3 Equipment

LTAs and Commits

- A4 ICs
- A5 Materials
- A6 Equipment

Production management

- A7 Inventory
- A8 Utilization
- A9 Forecasting

Demand

- B1 Demand over the last year
- B2 Demand forecast

Implications

- C1 Risks and opportunities

Executive summary

1. Survey suggests that the semiconductor supply chain is continuing to recover from persistent challenges experienced since COVID
   - Majority of respondents (~82%) **report same or improved lead times for their input materials**
   - Robust improvements (~20%-50%+) in **supplier commits** to customer forecasts
   - At the aggregate level, all categories reported **inventory at or above target levels**
2. As expected, there are variations in experiences at specific device, material, and equipment segments
   - Logic and Memory are experiencing **lead times closer to normal** compared to other device types (e.g., analog, discretes, etc.)
   - Several supply chain categories – e.g., front end equipment, substrates, masks, etc. – are **still experiencing long lead times** relative to normal levels, and have **poor recovery momentum** compared to the average
   - Across IC types, less than ~35% of respondents have greater than 40% of supply under long-term agreements (LTAs); whereas with **equipment and materials suppliers, >60% of respondents have greater than 40% of their input materials under LTAs**
3. While supply continued to recover, the demand picture for 2023 was overall negative compared to 2022 (as reported in the 2024 and 2023 surveys respectively), and the outlook for 2024 is highly divergent across IC producers and suppliers
   - Over 2023, **only 34% of respondents saw 3-10+% in growth**, compared to ~52% in 2022
   - **Only 22% of respondents expect an increase in IC demand growth in 2024**, compared to 66% for equipment and materials supplies
4. Over the next year, the industry views **emerging markets** (e.g., HPC, AI), **developments in node / packaging technology,** and **government incentives** will create the largest opportunities across the semiconductor supply chain
5. Respondents cite **geopolitics and trade, the talent shortage,** and **supply chain disruptions** as the most significant risks

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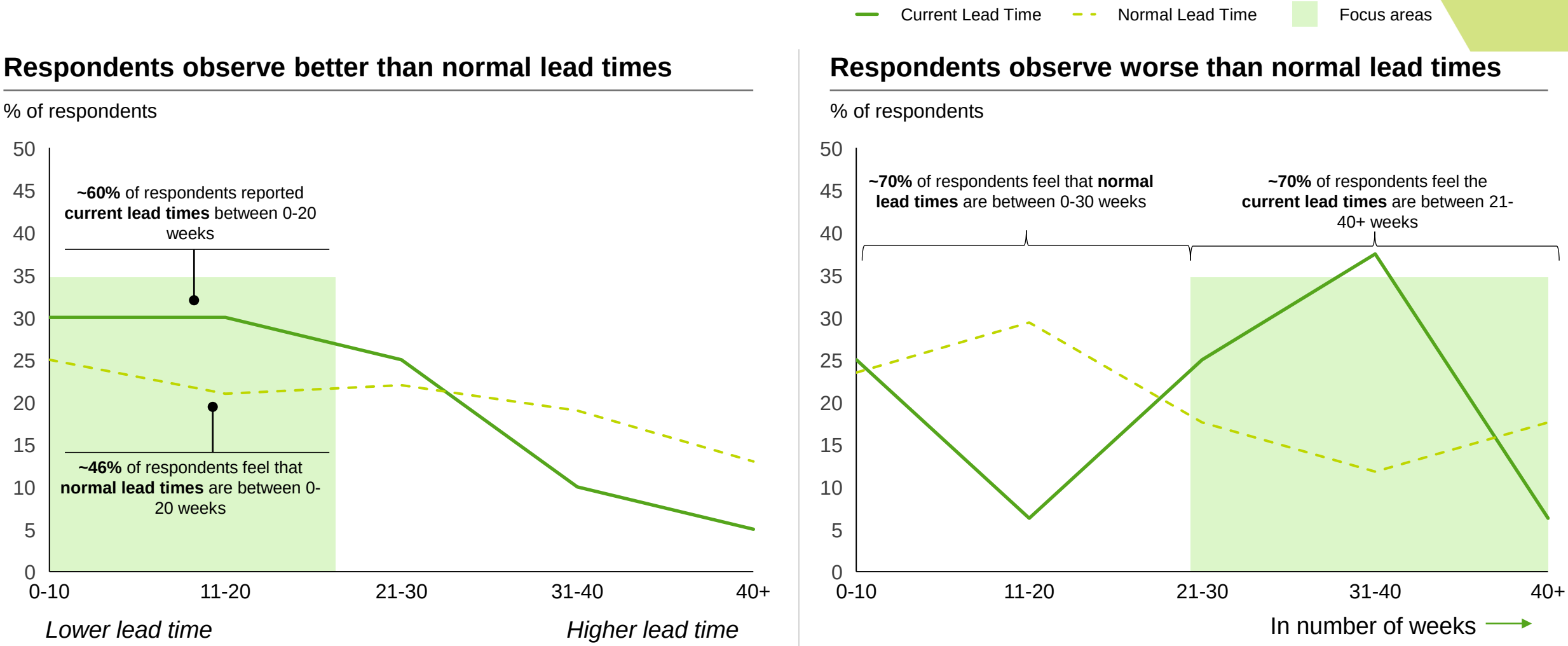
A How to read lead time data



A1 Lead times – Logic and Memory ICs

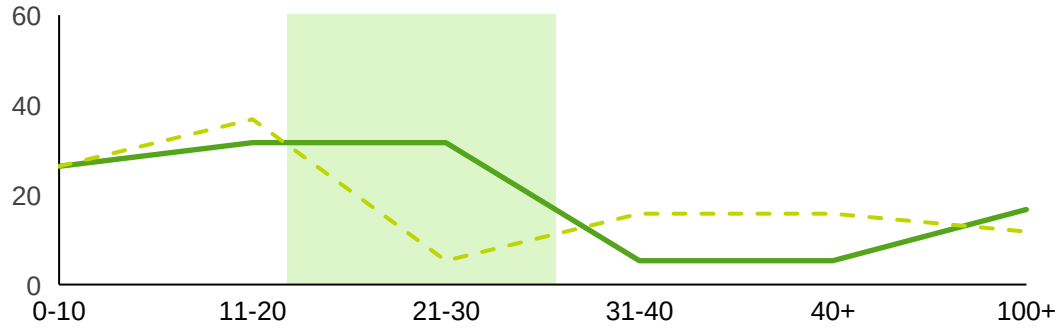
Respondents believe Logic and Memory have experienced improved lead times, with positive momentum in last quarter

Focus areas

What is the current lead time vs. normal lead time for Logic and Memory ICs (in weeks)?

Logic, % of respondents

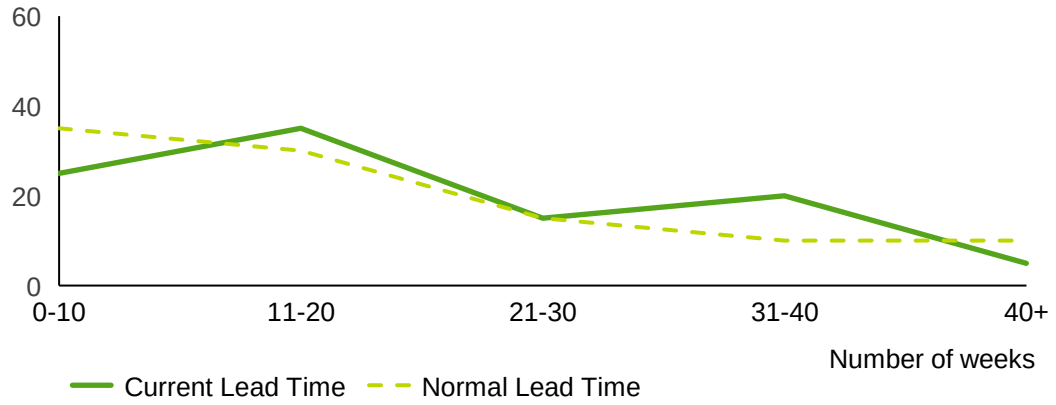
n = 19, 19



Respondents are experiencing better lead times than normal on logic

Memory, % of respondents

n = 20, 20

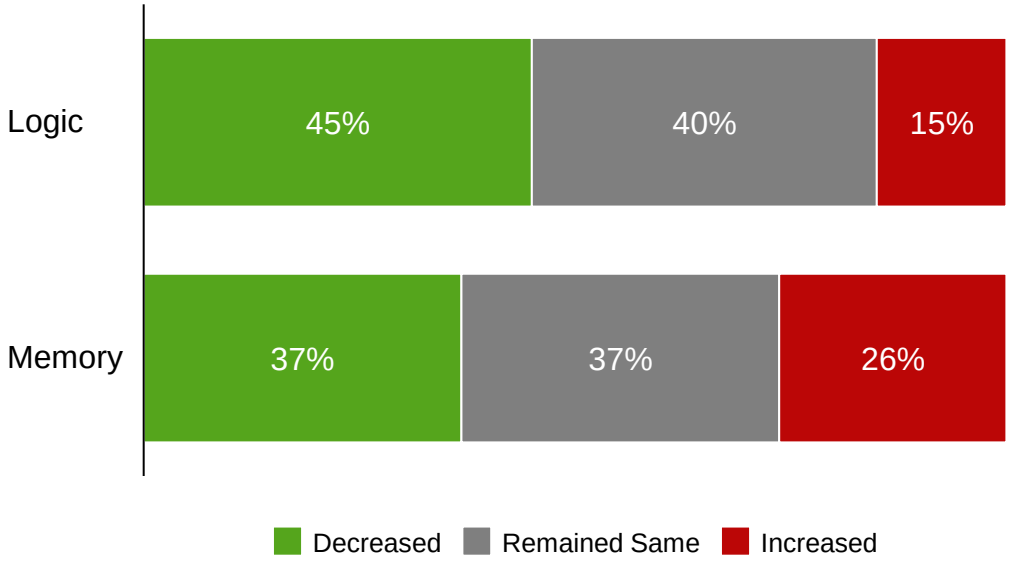


Memory lead times appear to be balanced

How have lead times changed compared to last quarter?

% of respondents

n = 20, 19



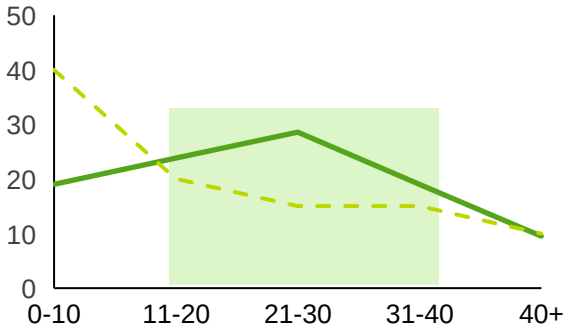
A1 Lead times – Other device types

Respondents reported other device lead times decreased compared to last quarter, but lead times are still typically higher than normal

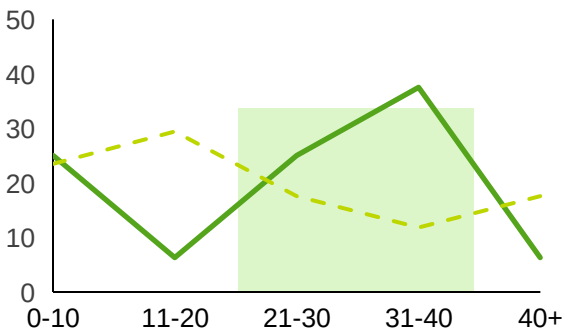
Focus areas

What is the current lead time vs. normal lead time for Other ICs (in weeks)?

Analog, % n = 21, 20



Microcomponent, % n = 16, 17

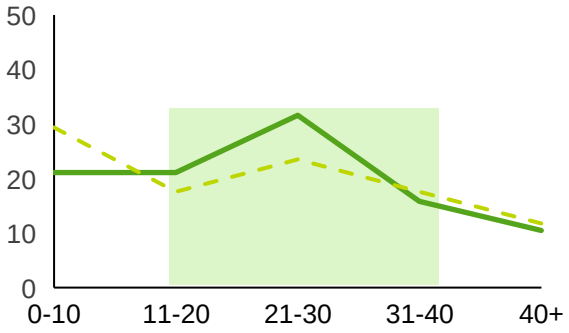


Respondents have in general experienced **longer lead times than normal**

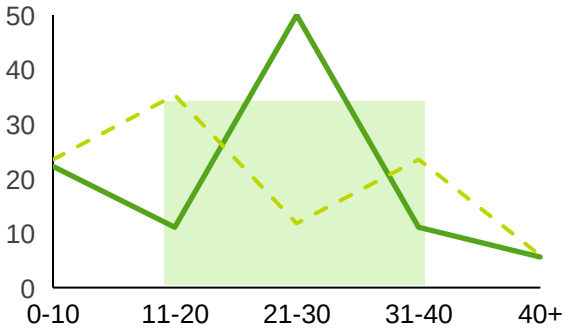
Current Lead Time

Normal Lead Time

Discretes, % n = 19, 17



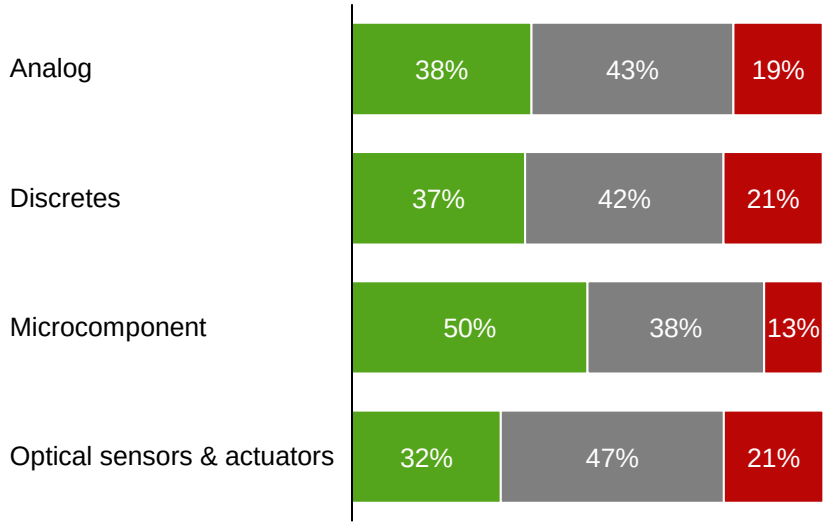
Optical sensors & actuators, % n = 18, 17



Number of weeks

How have lead times changed compared to last quarter?

% of respondents n = 21, 19, 16, 19, respectively

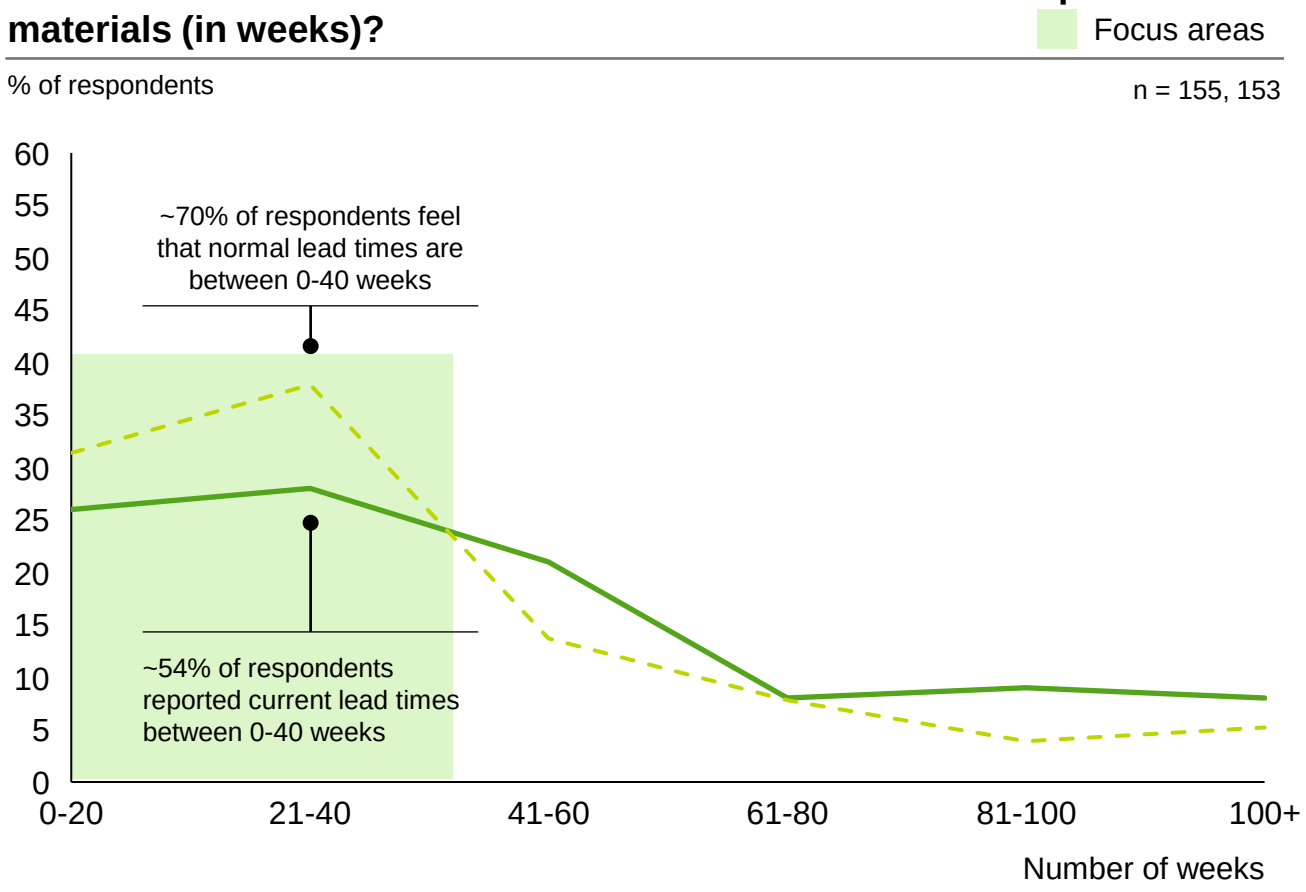


Decreased Remained Same Increased

A2 Lead times – Materials Overview

Relative to last quarter, respondents report that input material lead times have improved, resembling durations closer to normal levels

What is the current lead time vs. normal lead time across input materials (in weeks)?



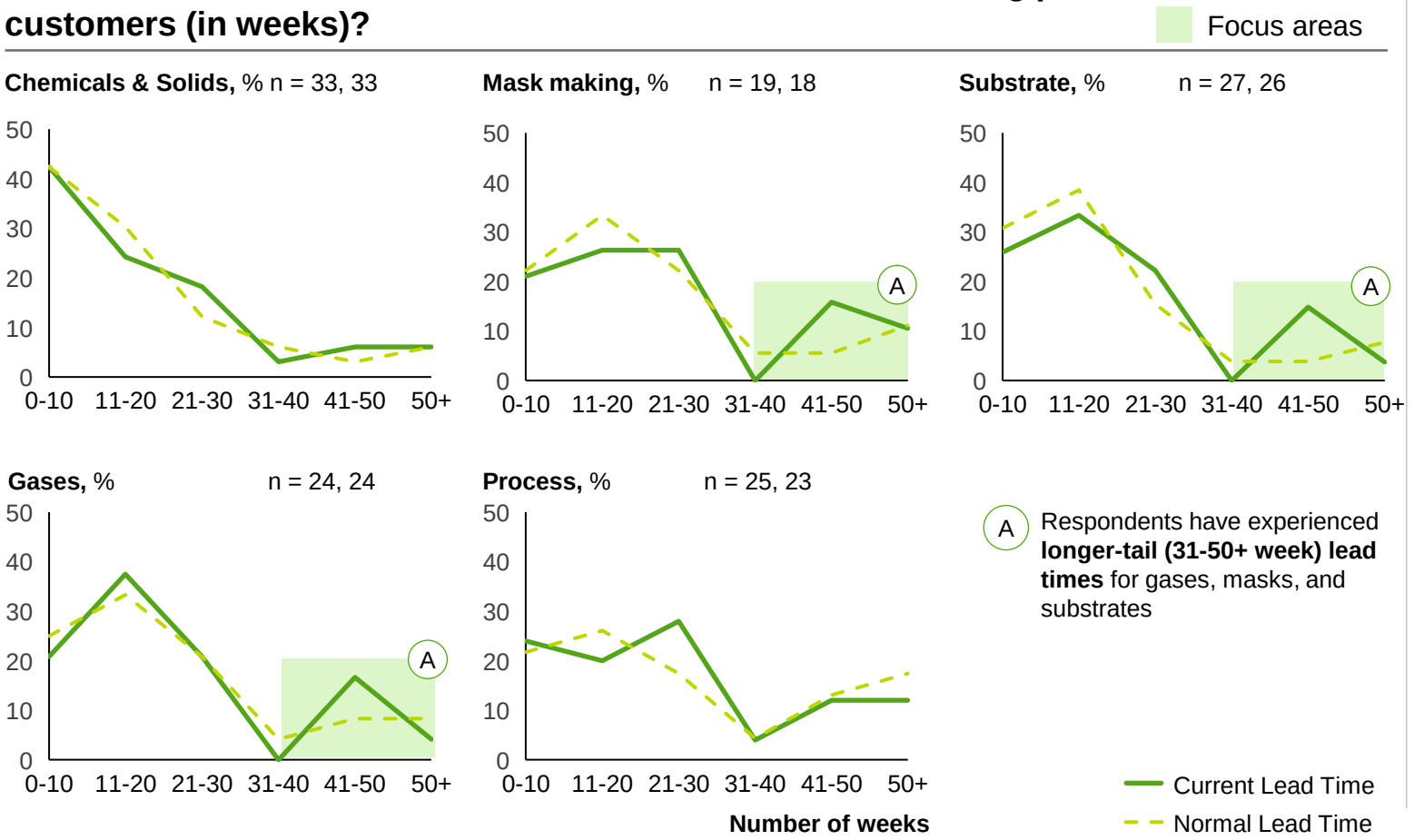
How have lead times changed compared to last quarter?

1. Individual input materials can have better or worse lead times relative to the overall

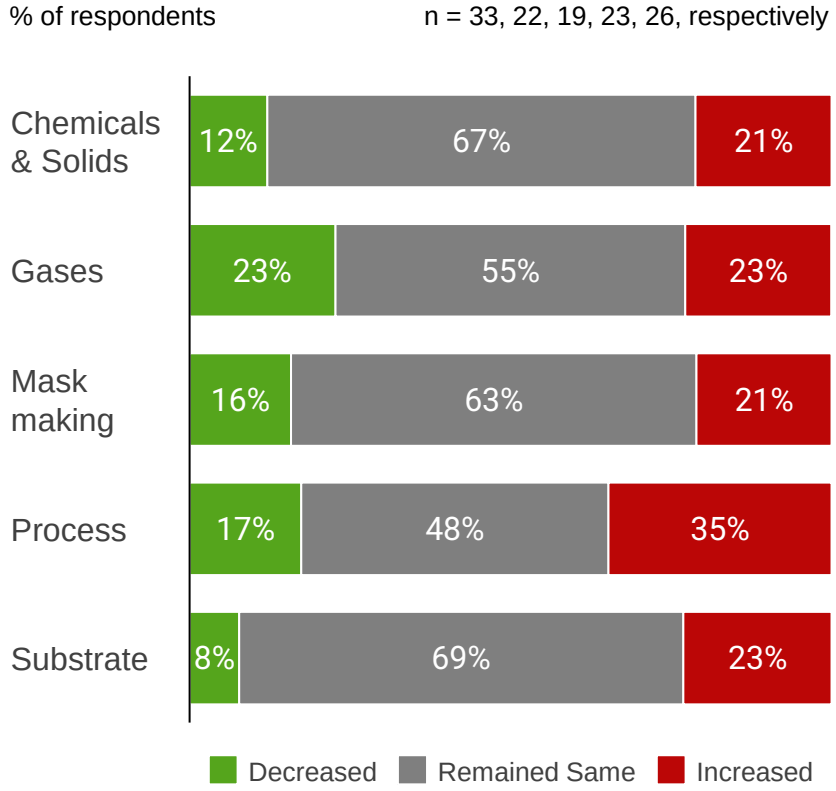
A2 Lead times – Input Materials deep-dive

Across material supply chains, respondents felt lead times have generally remained the same or increased, with gases, masks, and substrates still experiencing some long lead times

What is the current lead time vs. normal lead time for delivering products to customers (in weeks)?



How have lead times changed compared to last quarter?



A3 Lead times – Equipment overview

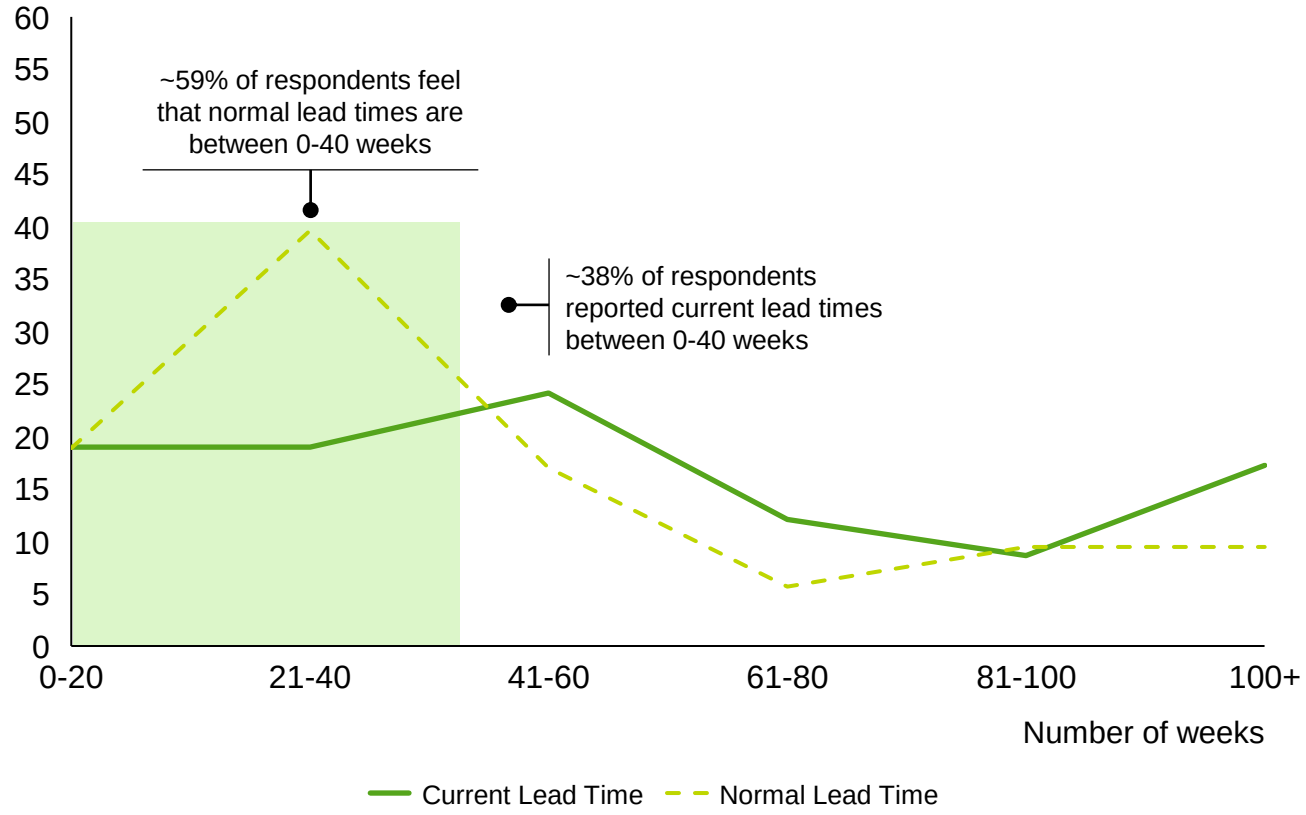
Compared to last quarter, ~88% of the respondents believe that overall equipment lead times have remained the same or increased, and are still off target relative to normal levels

Focus areas

What is the current lead time vs. normal lead time across equipment (in weeks)?

% of respondents

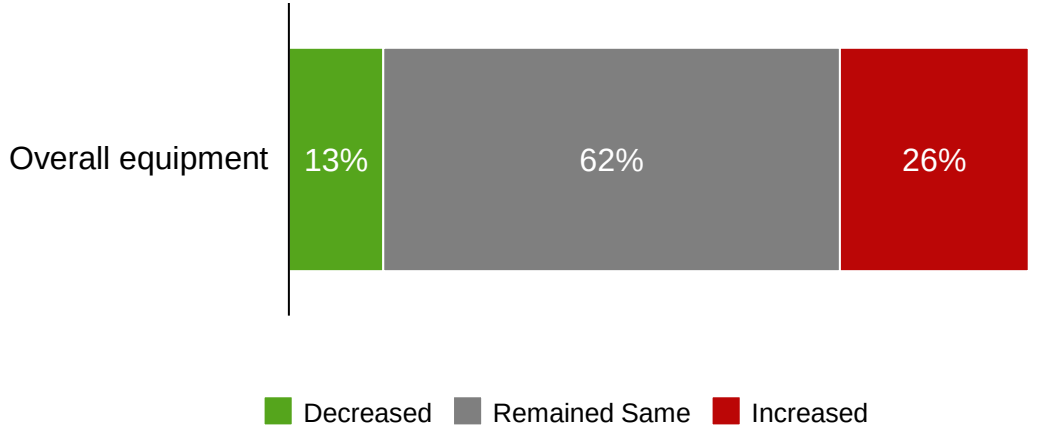
n = 58, 53



How have lead times changed compared to last quarter?

% of respondents

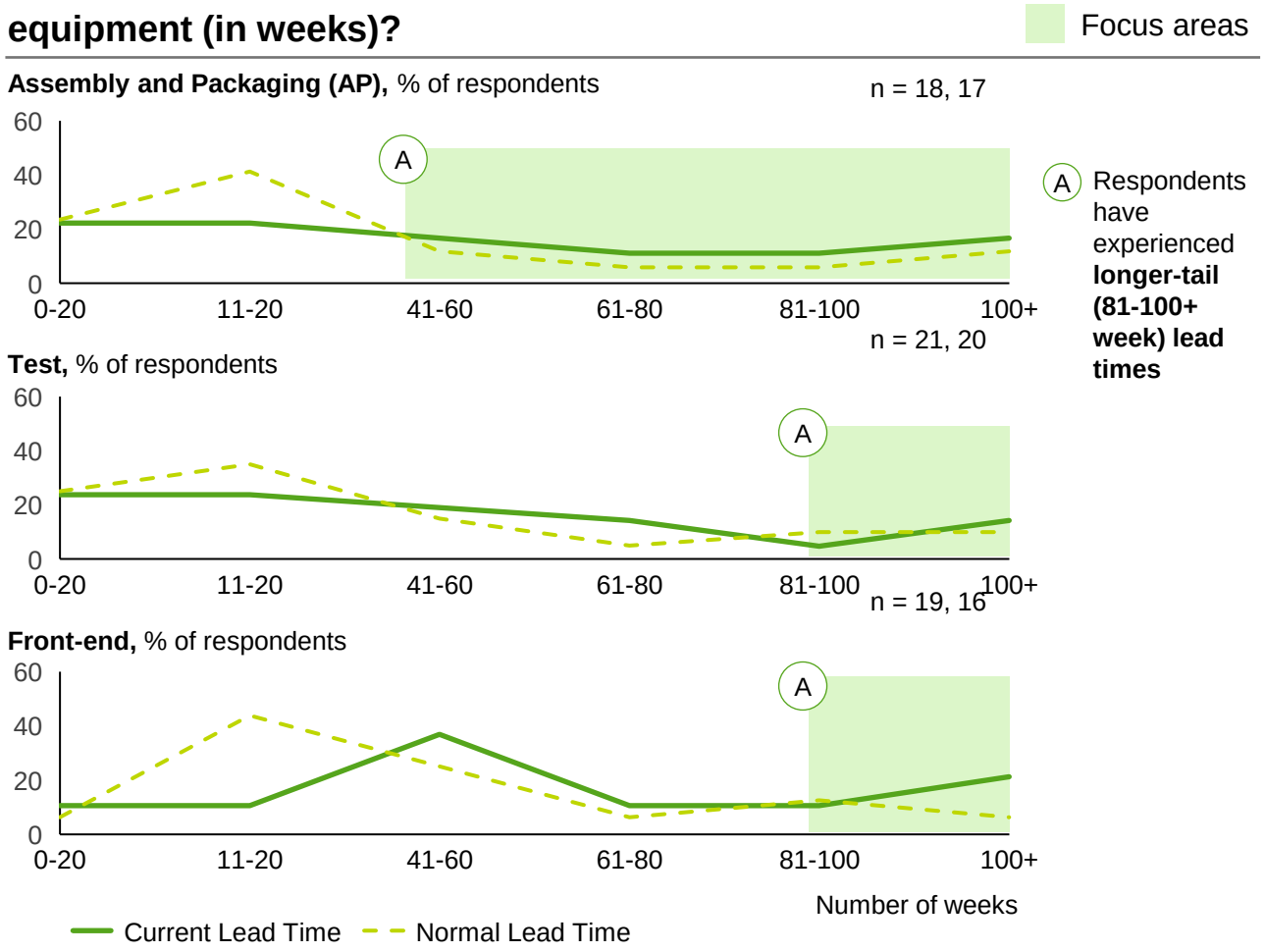
n = 47



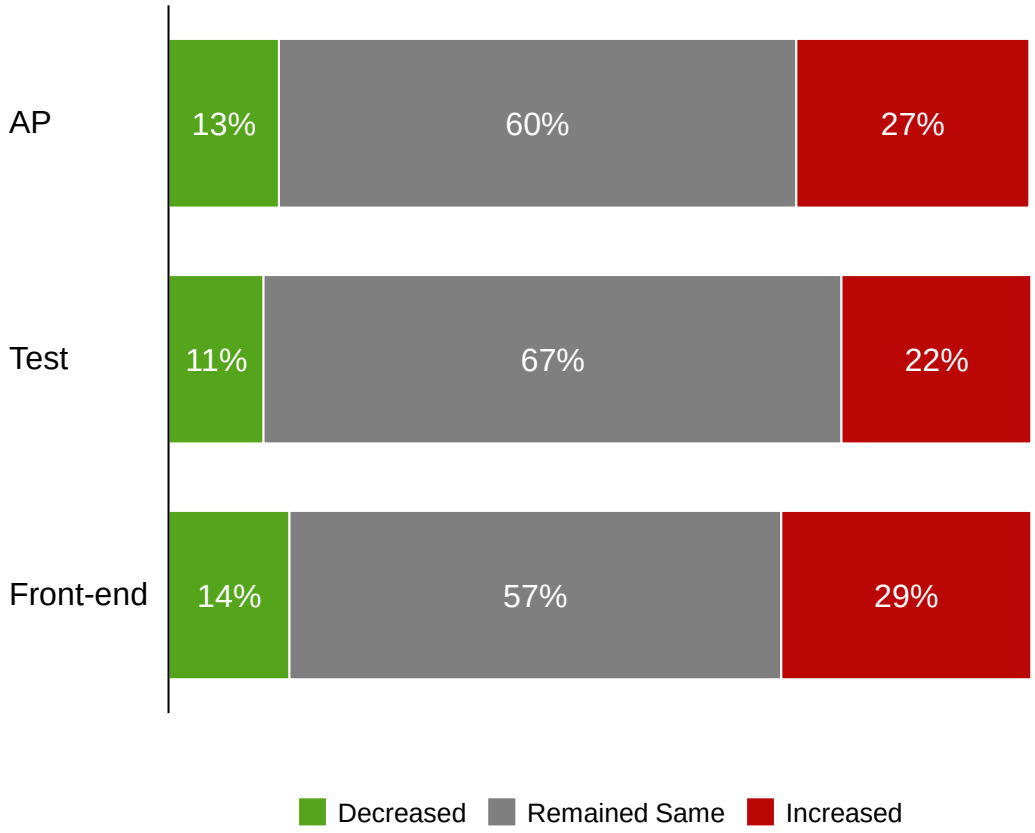
A3 Lead times – Equipment deep dive

Survey suggests customers are experiencing longer than normal lead times for equipment, with some respondents experiencing 81-100+ week lead times (e.g., Front-End equipment)

What is the current lead time vs. normal lead time across equipment (in weeks)?



How have lead times changed compared to last quarter?



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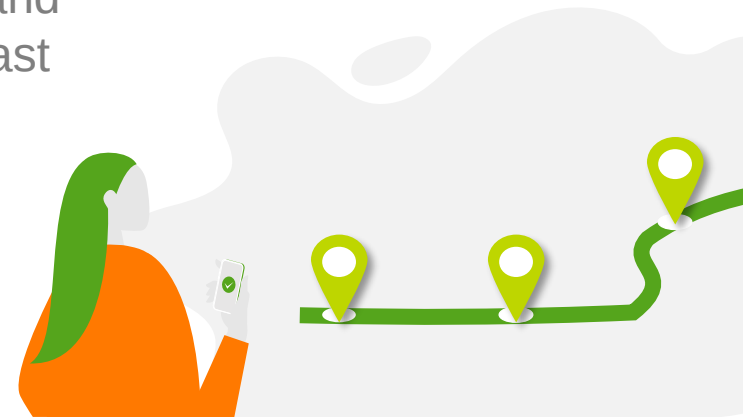


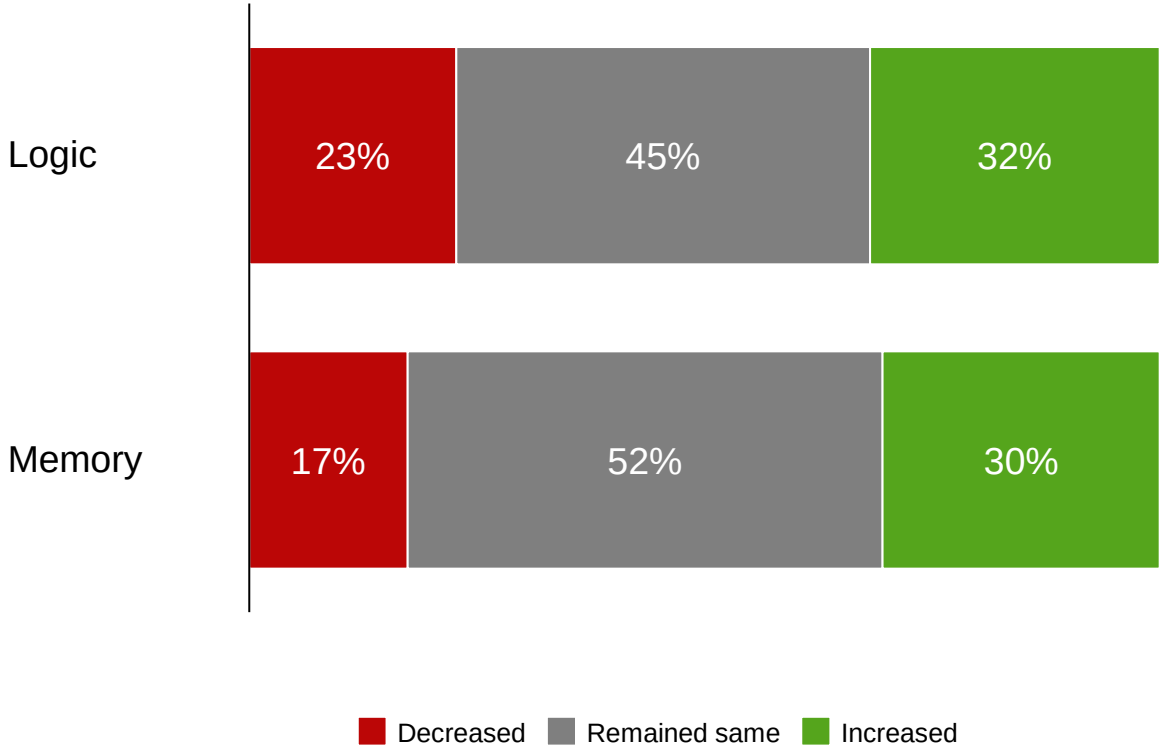
A4 LTAs and Commits – Logic and Memory

While more respondents reported an increase in supplier commits, there is still low LTA coverage leveraged by Logic and Memory IC producers

What is the trend in supplier commits compared to the previous year?

% of respondents

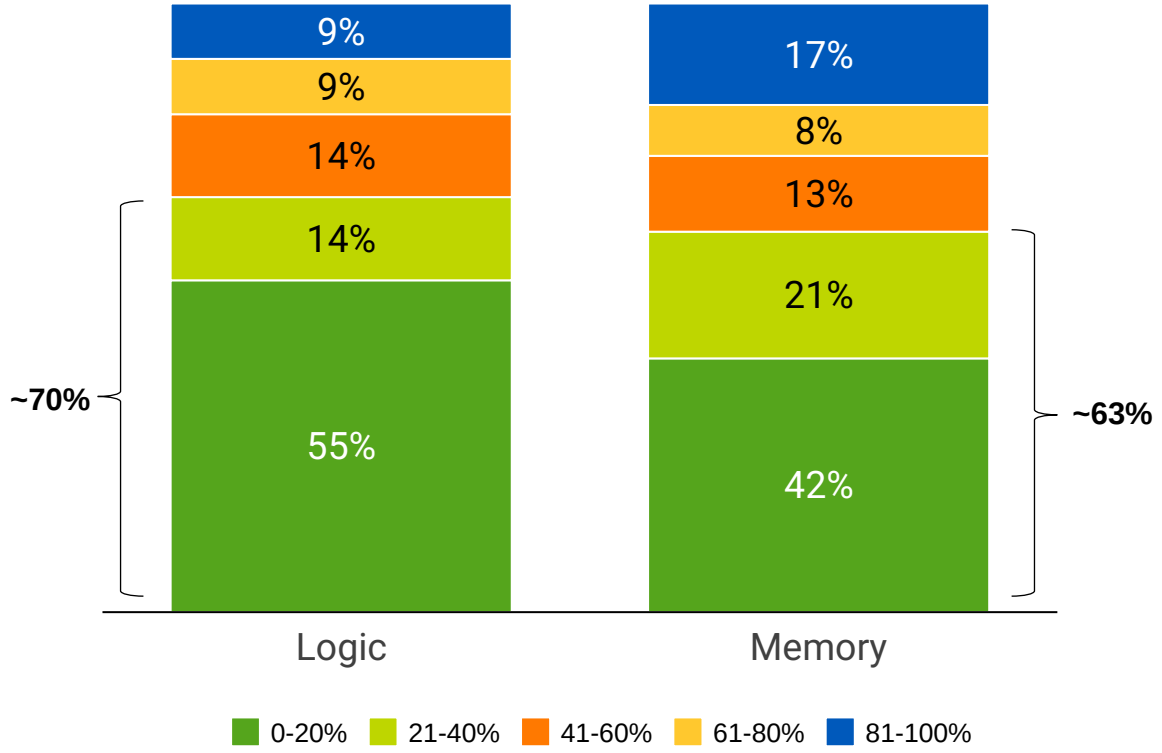
n = 22, 13



What share of materials purchased from your suppliers are under LTAs?

% of respondents

n = 19, 20



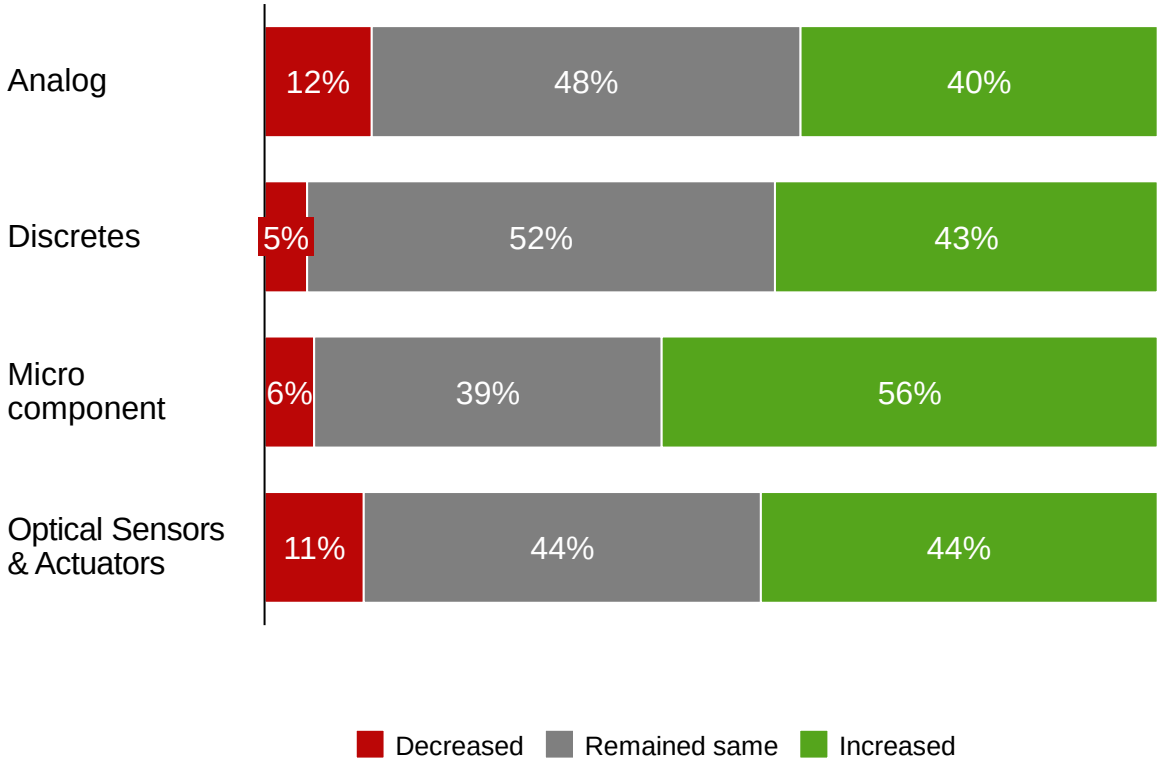
A4 LTAs and Commits – Other device types

Similar to Logic and Memory, respondents experienced an increase in supplier commits for other IC types; LTAs are also relatively uncommon

What is the trend in supplier commits compared to the previous year?

% of respondents

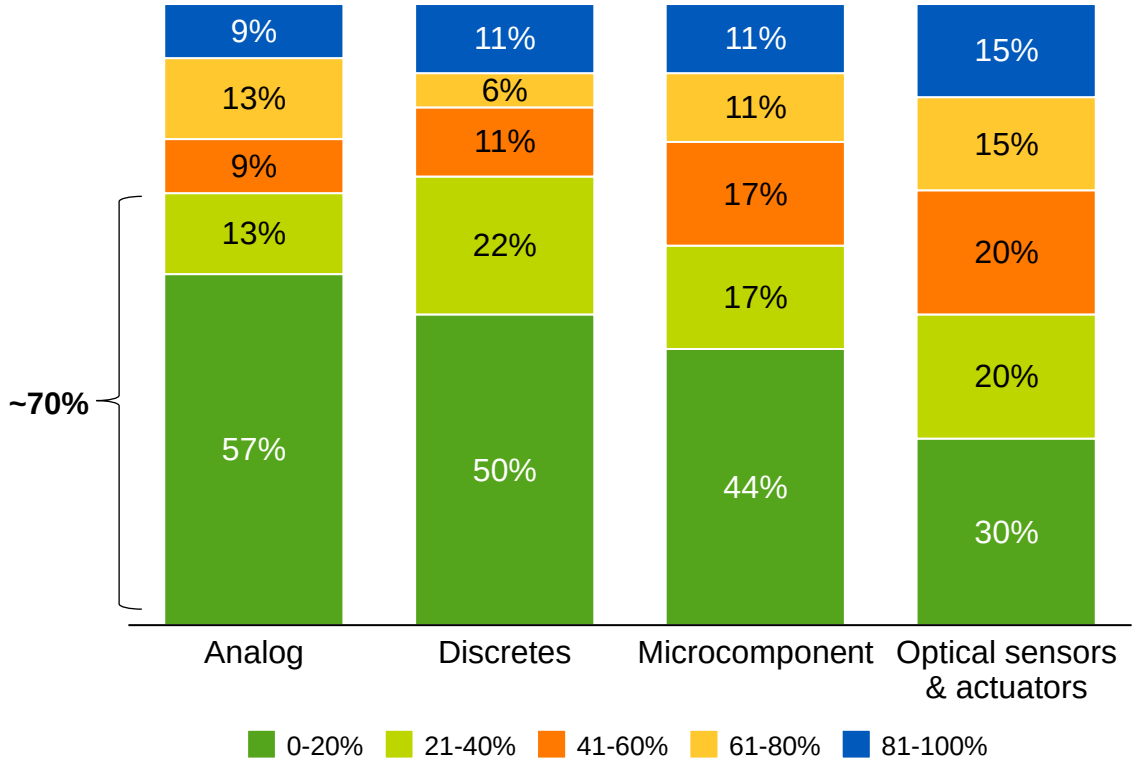
n = 25, 21, 18, 18, respectively



What share of materials purchased from your suppliers are under LTAs?

% of respondents

n = 21, 19, 16, 18, respectively



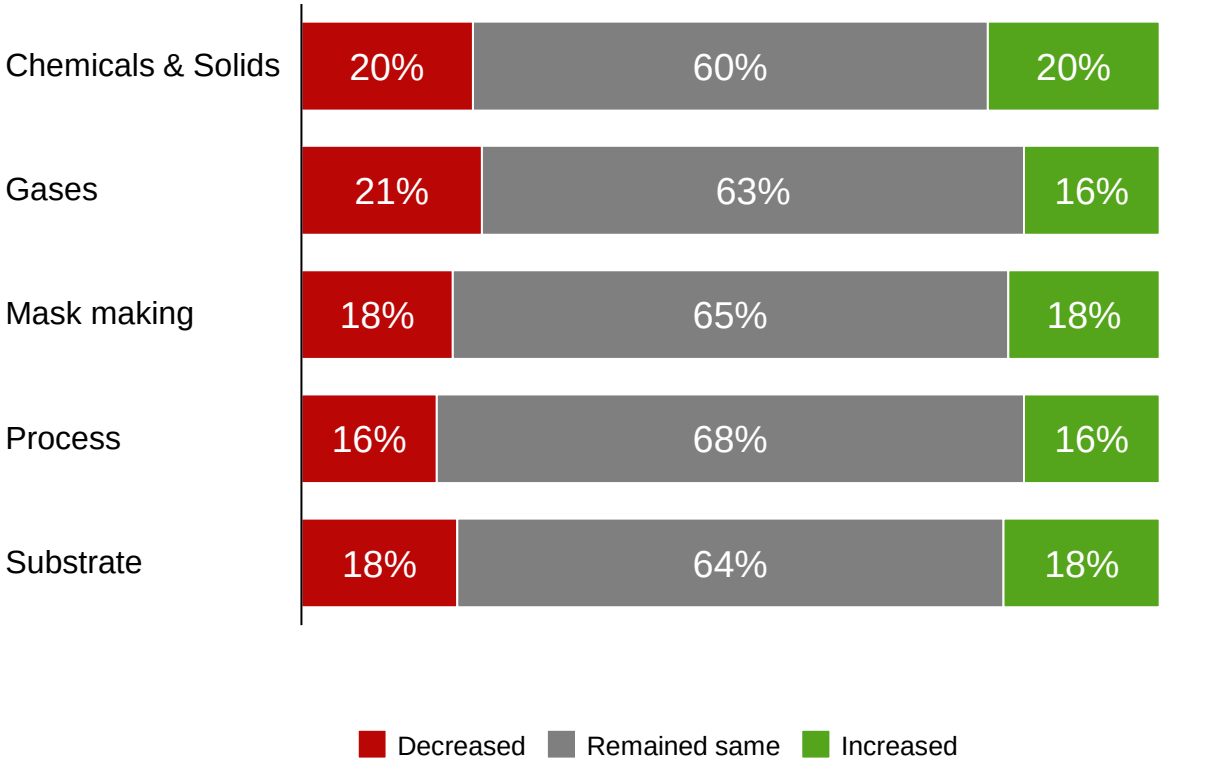
A5 LTAs and Commits – Input Materials

While respondents have experienced mixed responses on supplier commits, over 60% of respondents across input materials have greater than 40% of their input materials covered under LTAs

What is the trend in supplier commits compared to the previous year?

% of respondents

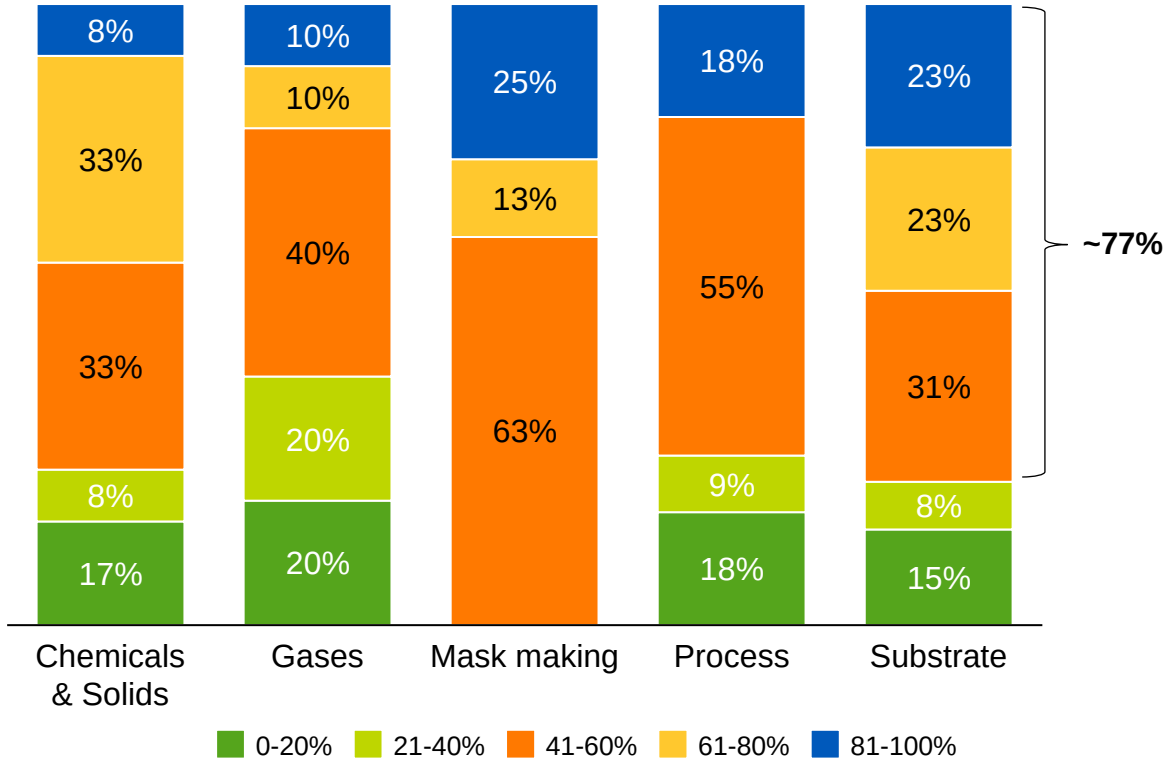
n = 20, 19, 17, 19, 22, respectively



What share of materials purchased from your suppliers are under LTAs?

% of respondents

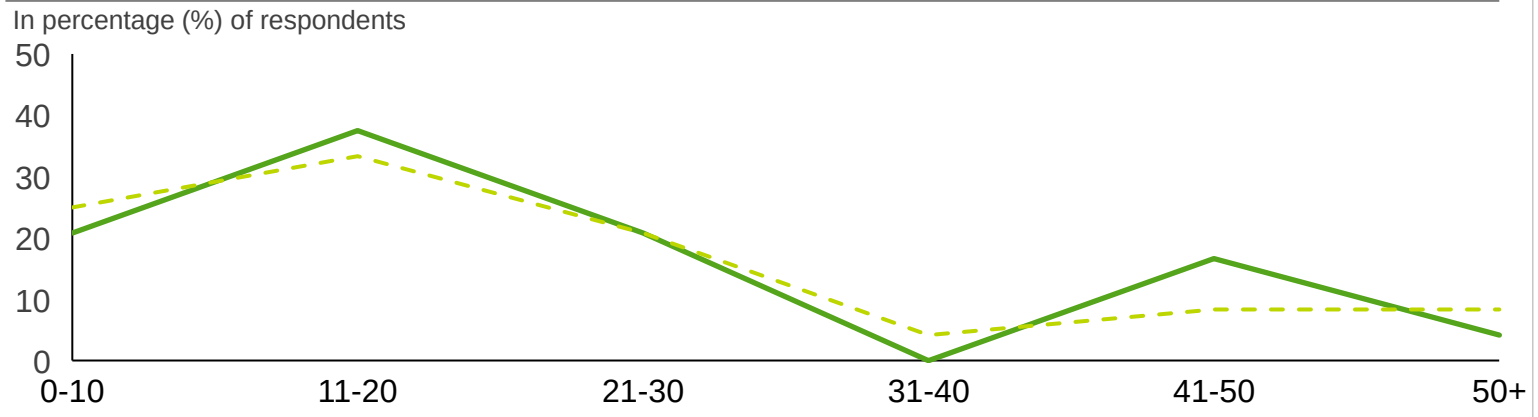
n = 12, 10, 8, 11, 13, respectively



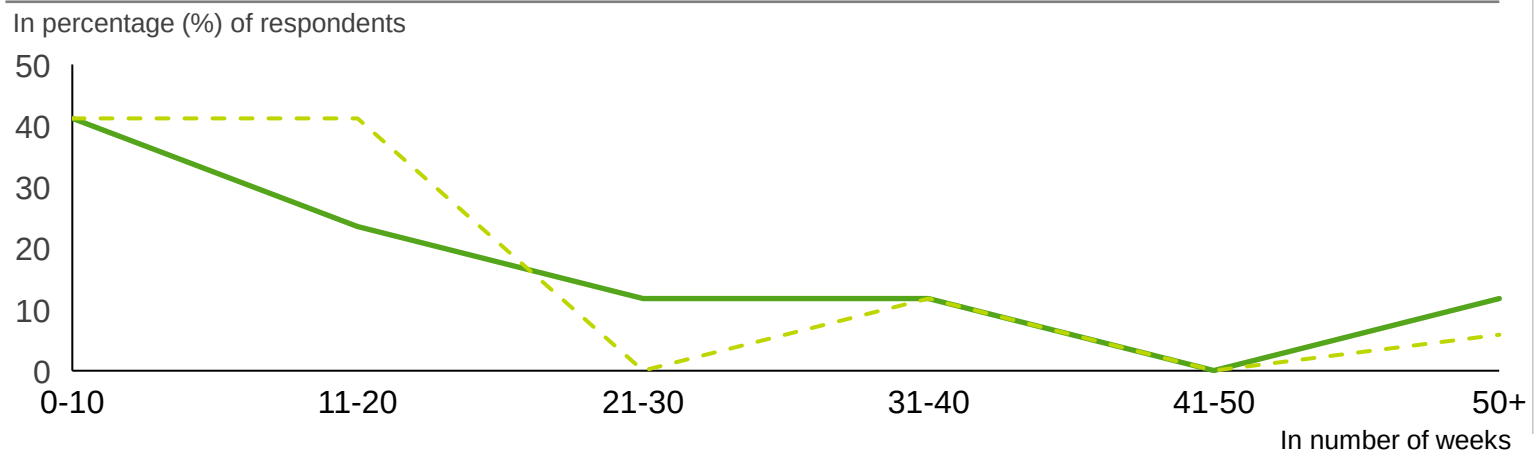
A5 Deep-dive Preview – Gases

Customers are experiencing lead times closer to normal levels; high percentage of materials under LTAs

Lead times to deliver product to customer (in weeks), n = 24, 24

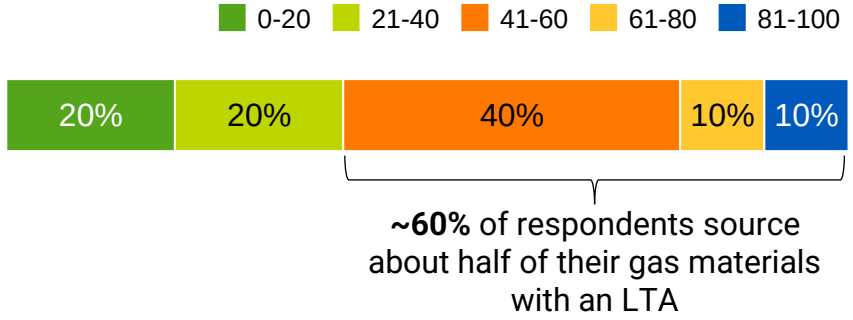


Lead times across input materials (in weeks), n = 17, 17

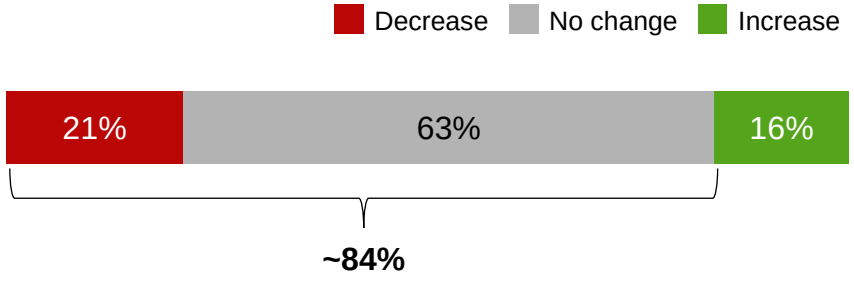


Majority of respondents have gases materials covered under LTAs…

Percent of materials covered under LTA, n = 5



… and majority respondents experienced supplier commits remaining consistent or decreasing
n = 19



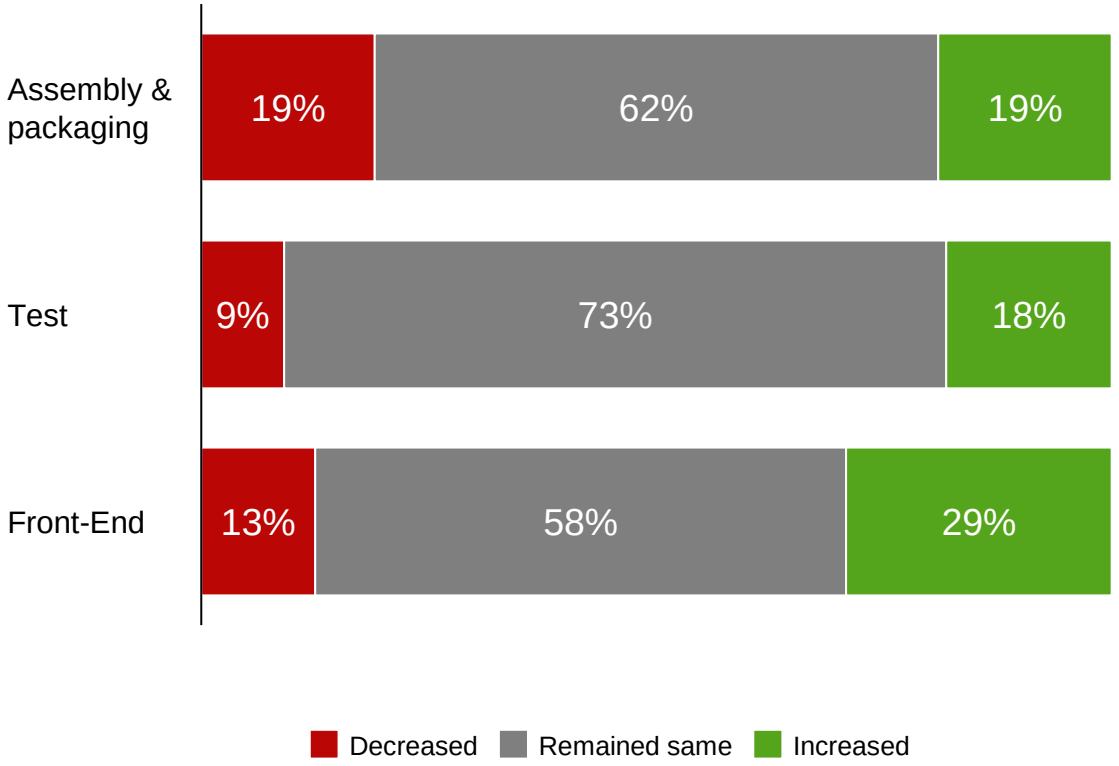
A6 LTAs and Commits – Equipment

A greater proportion of respondents experienced an increase in supplier commits, with more than ~60% of respondents having 40% or more materials under LTA

What is the trend in supplier commits compared to the previous year?

% of respondents

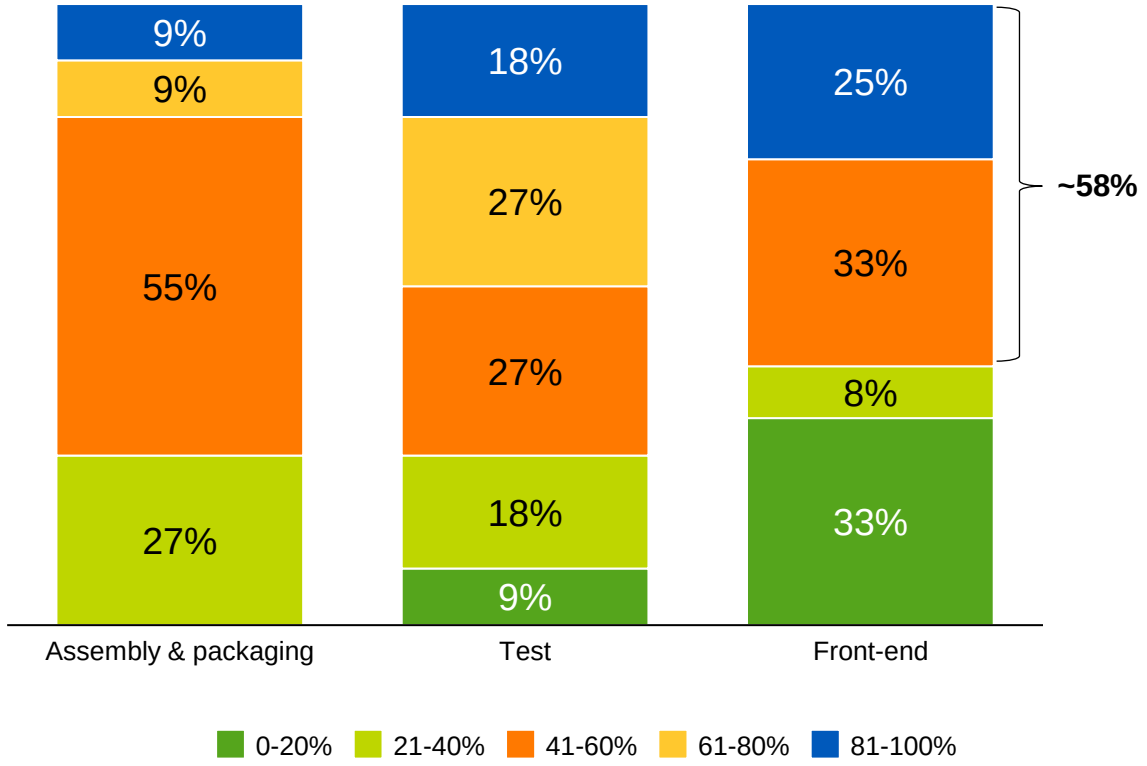
n = 21, 22, 24 respectively



What share of materials purchased from your suppliers are under LTAs?

% of respondents

n = 11, 11,12 respectively



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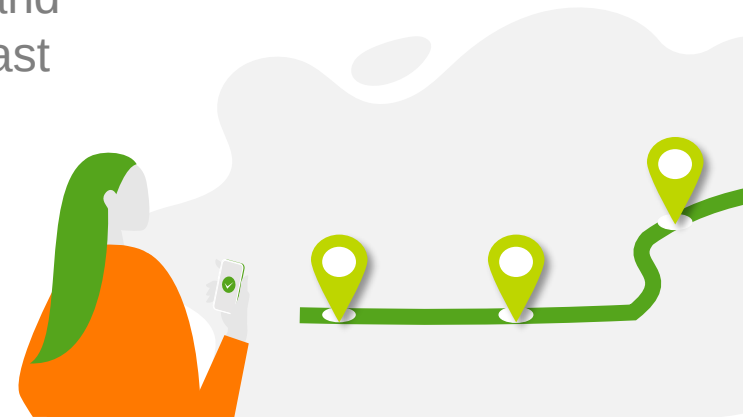
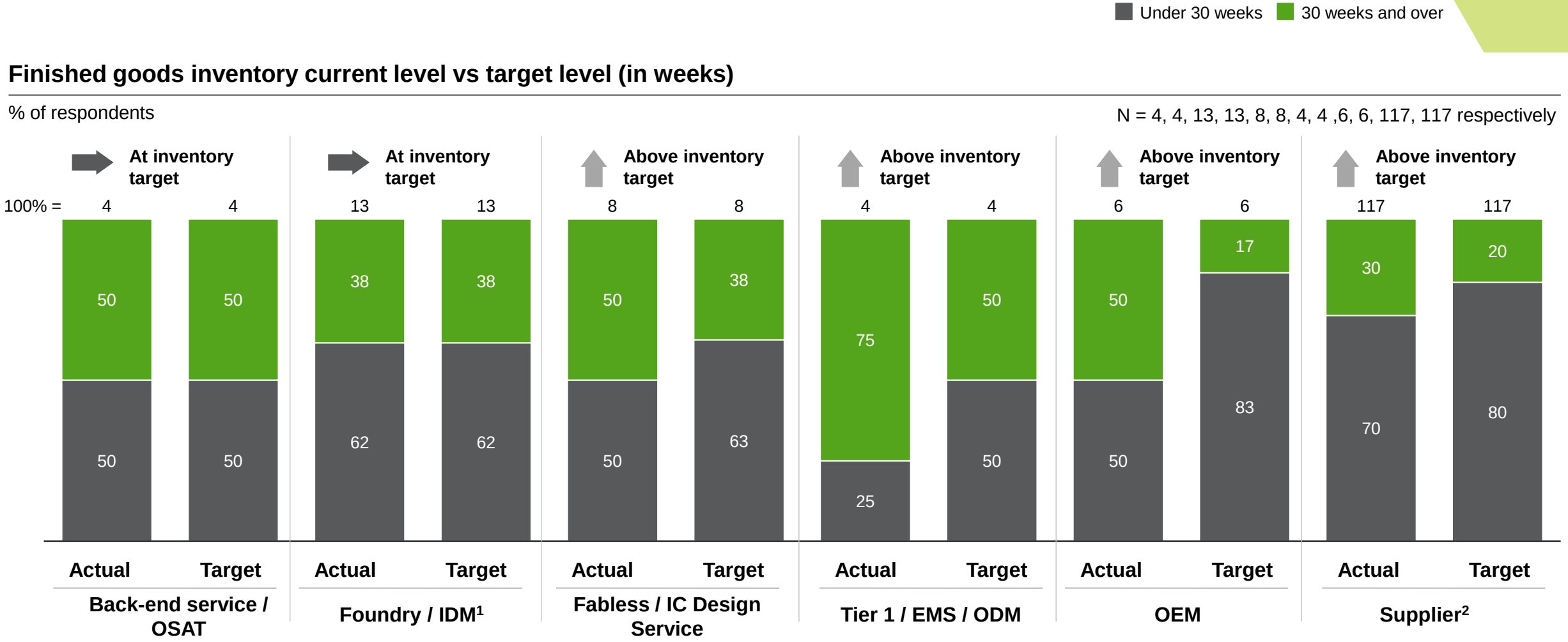


A7 Production Management – Finished goods inventory

Majority of industry respondents report finished goods inventory at or above inventory targets



1. Consists of Foundry and IDM
2. Consists of materials supplier, equipment supplier, and parts & components supplier

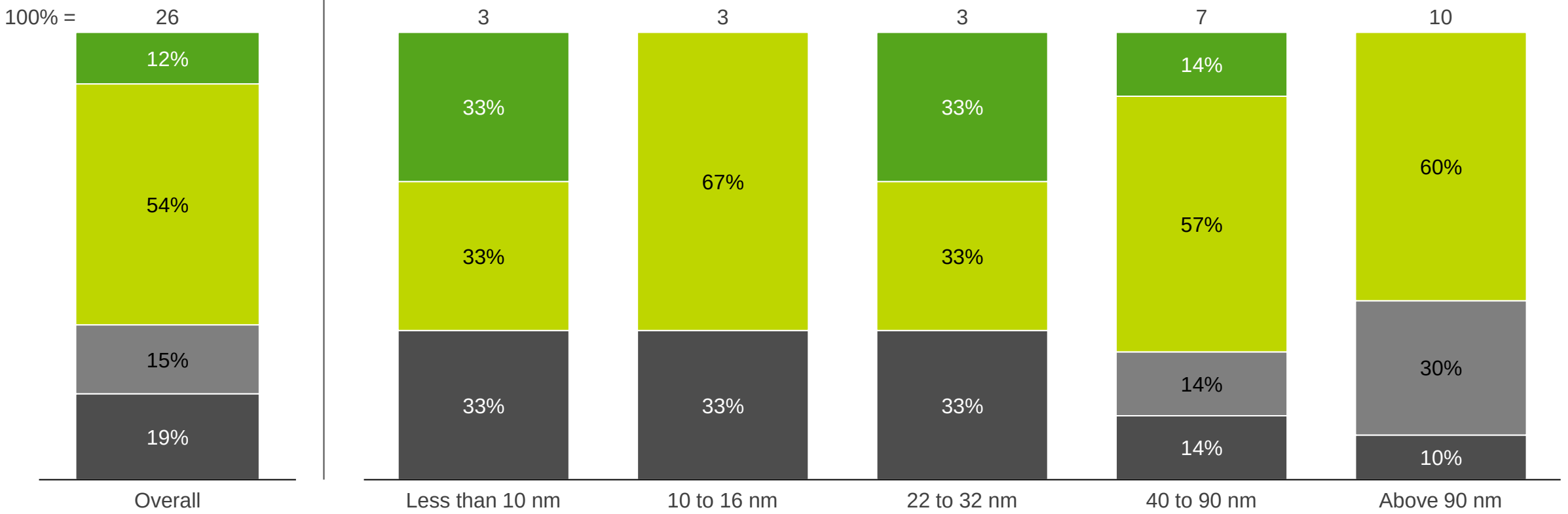
A8 Production Management – Utilization

Majority of industry respondents are at production utilization rates of 61-90%

What is the current utilization of your production capacity?

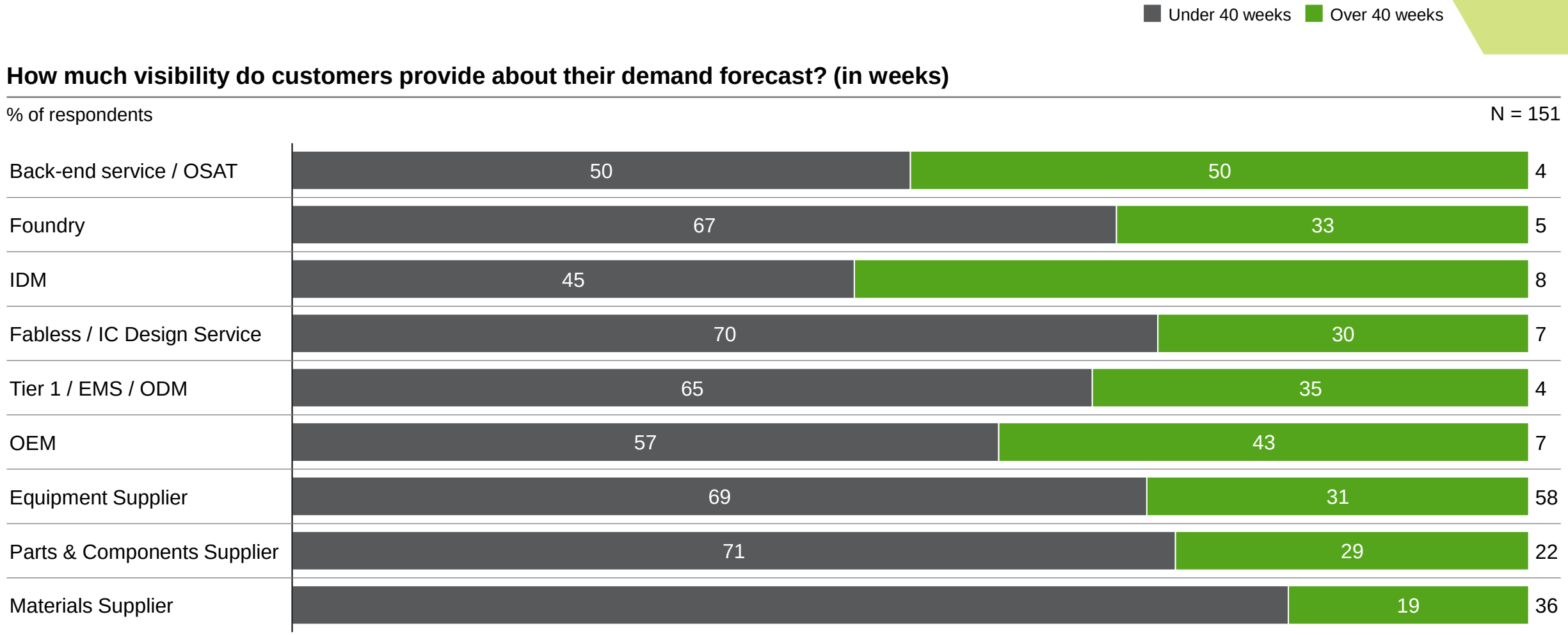
% of respondents

N = 26 respectively



A9 Production Management – Forecasting

Long term visibility reduces as we move deeper into the supply chain



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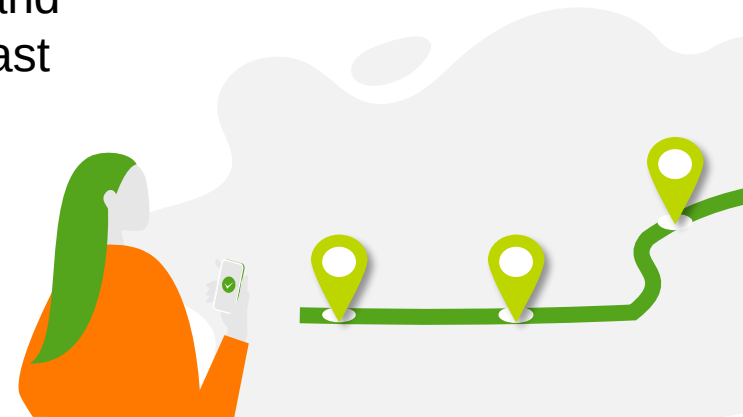


B1 Customer Demand – Demand over the last year

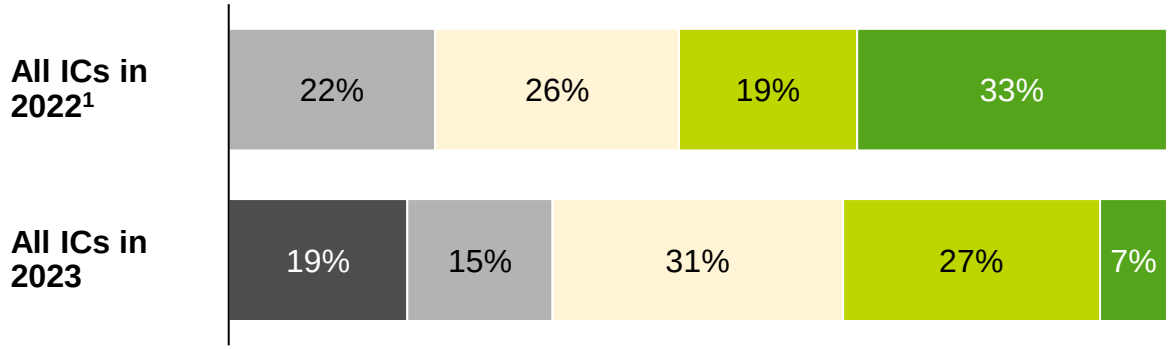
IC demand in 2023 (from 2024 survey) was mixed but in general dropped relative to 2022 (from 2023 survey)

Strongly decreased (greater than -10%) | Moderately decreased (-3% to -10%) | Remained the same (within 3% range) | Moderately increased (10% to 3%) | Strongly Increased (greater than 10%)

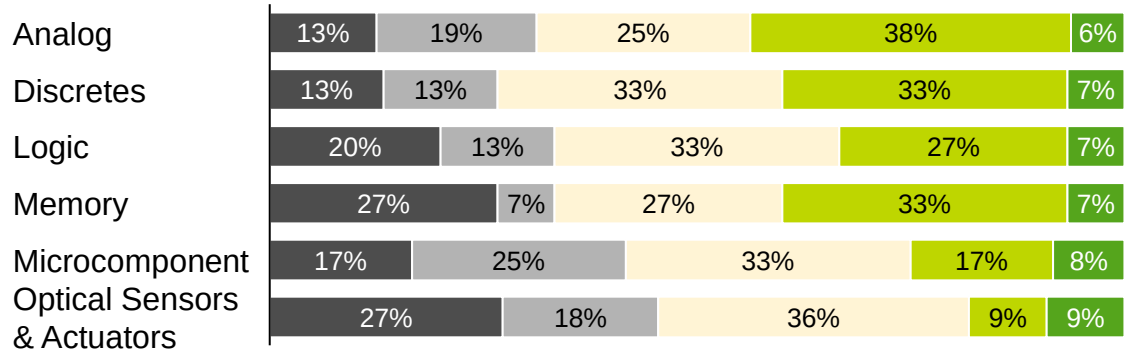
Compared to same quarter in previous year, what is the change in customer demand?

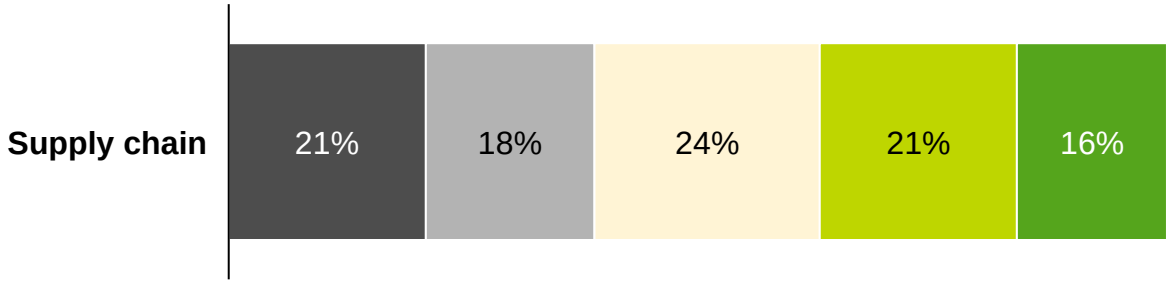
% of respondents

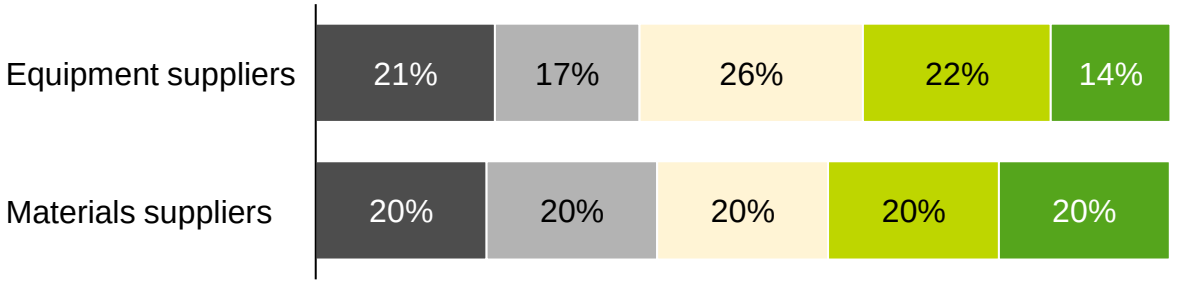
n = 30, 84, 100 respectively



n = 16, 15, 15, 15, 12, 11, 65, 35 respectively







1. 2023 SEMI SC survey results were adjusted to match reporting structure in 2024

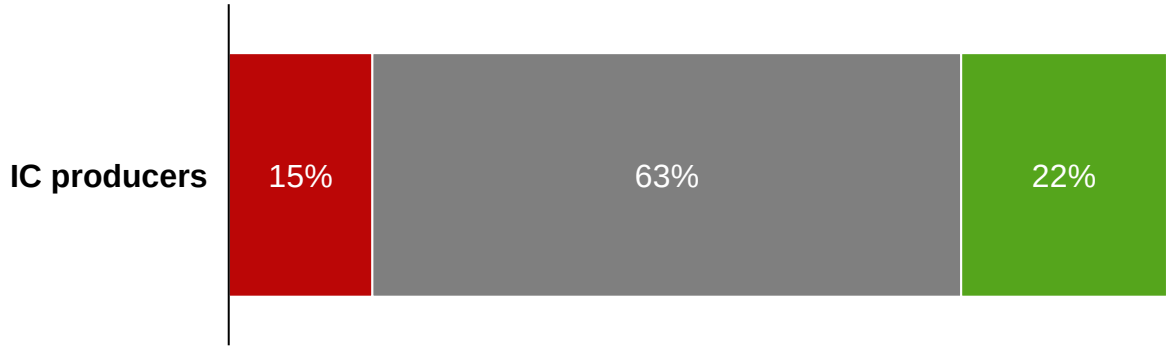
B2 Customer Demand – Demand forecast

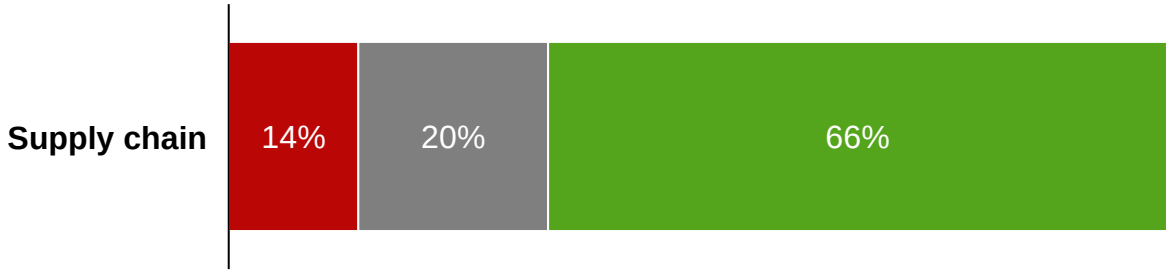
IC manufacturers and the supply chain have diverging perspectives on demand expectations over the next 6-12 months

How do you anticipate the expected change to be in next 6-12 months?

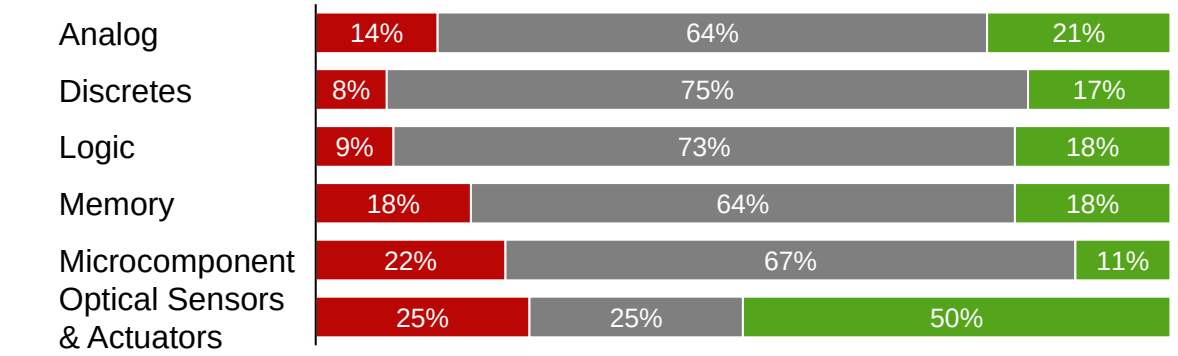
% of respondents

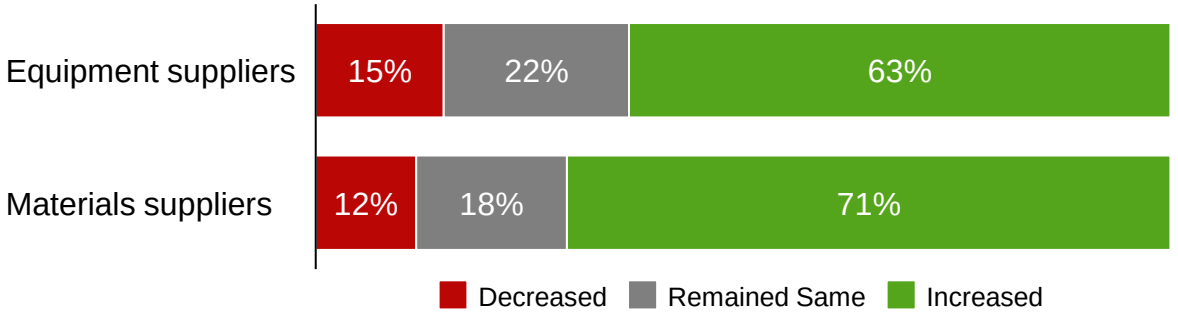
n = 65, 94





n = 14, 12, 11, 11, 9, 8, 58, 36 respectively





"Roadmap" for the SEMI Supply Chain survey

A B C

Supply

Lead times

- A1 ICs
- A2 Materials
- A3 Equipment

LTAs and Commits

- A4 ICs
- A5 Materials
- A6 Equipment

Production management

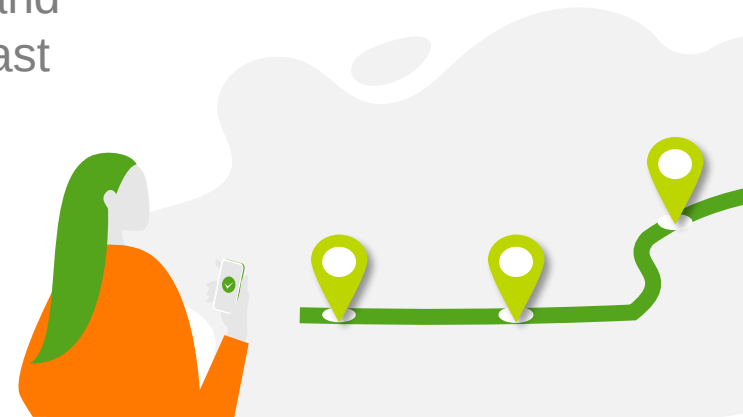
- A7 Inventory
- A8 Utilization
- A9 Forecasting

Demand

- B1 Demand over the last year
- B2 Demand forecast

Implications

- C1 Risks and opportunities

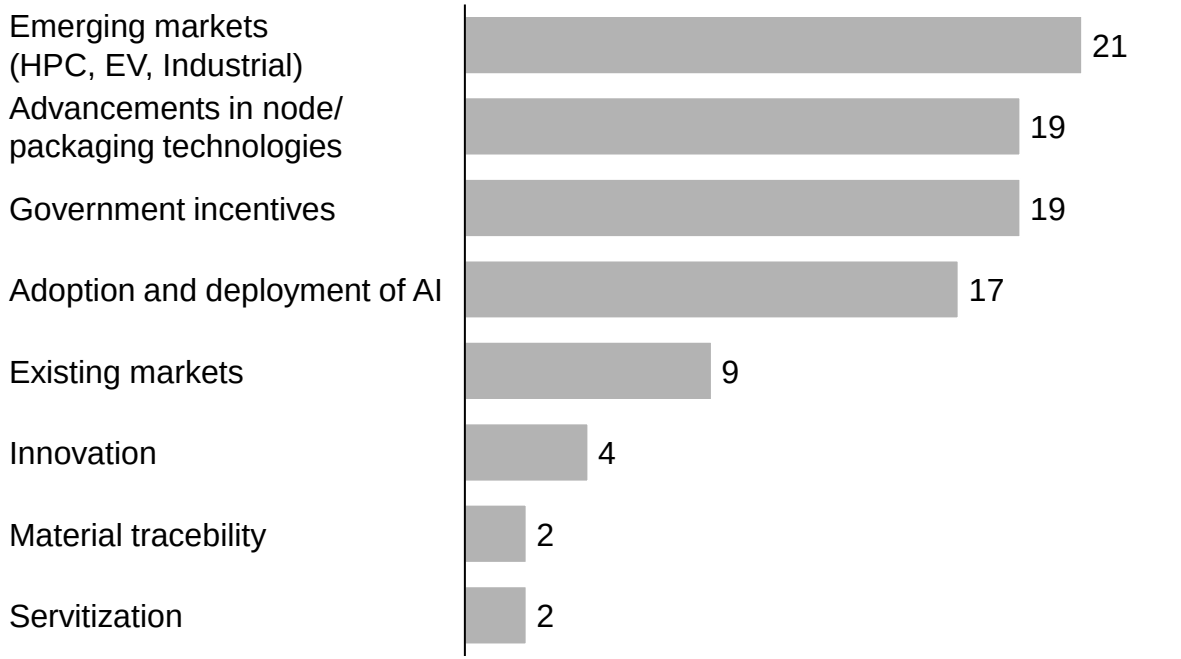


C1 Implications – Risks and opportunities

Emerging markets, advancements in nodes/packaging, and government incentives are perceived to be biggest supply chain tailwinds, with geopolitical tensions, and skilled labor availability posing as the biggest risks

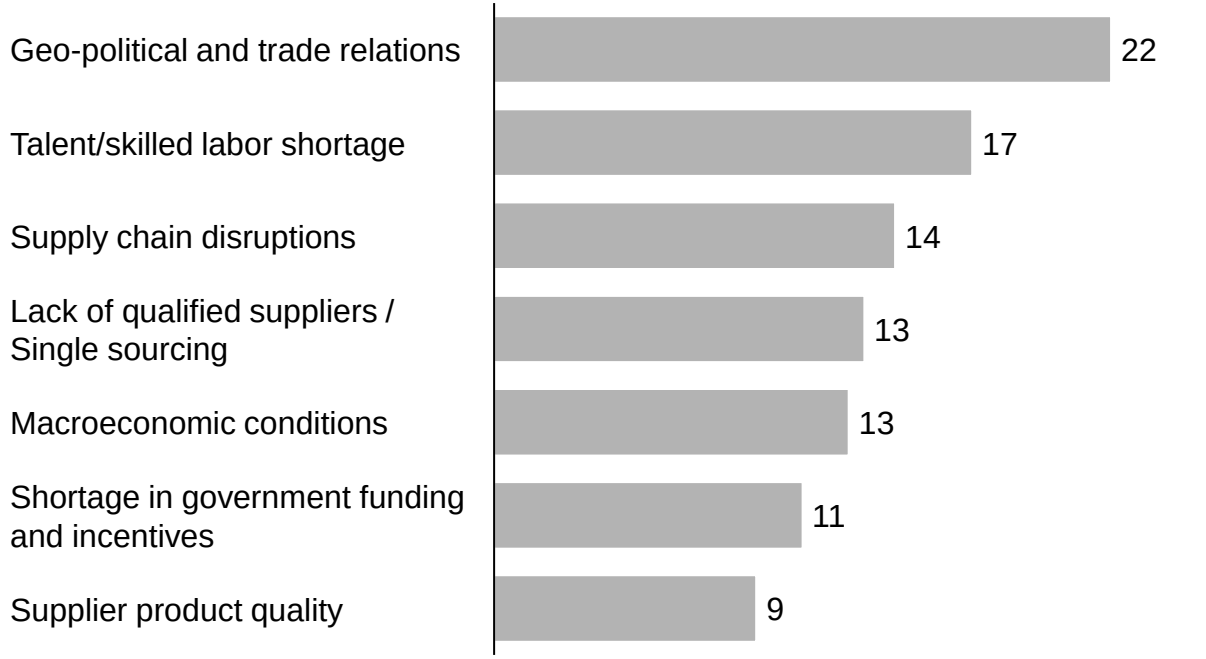
Which of the following developments do you perceive as biggest opportunity for the semiconductor supply chain in the next 12 months?

% of respondents N = 47



Which of the following developments do you perceive as the biggest long-term threat to your company's supply chain (beyond 6 months)?

% of respondents N = 183



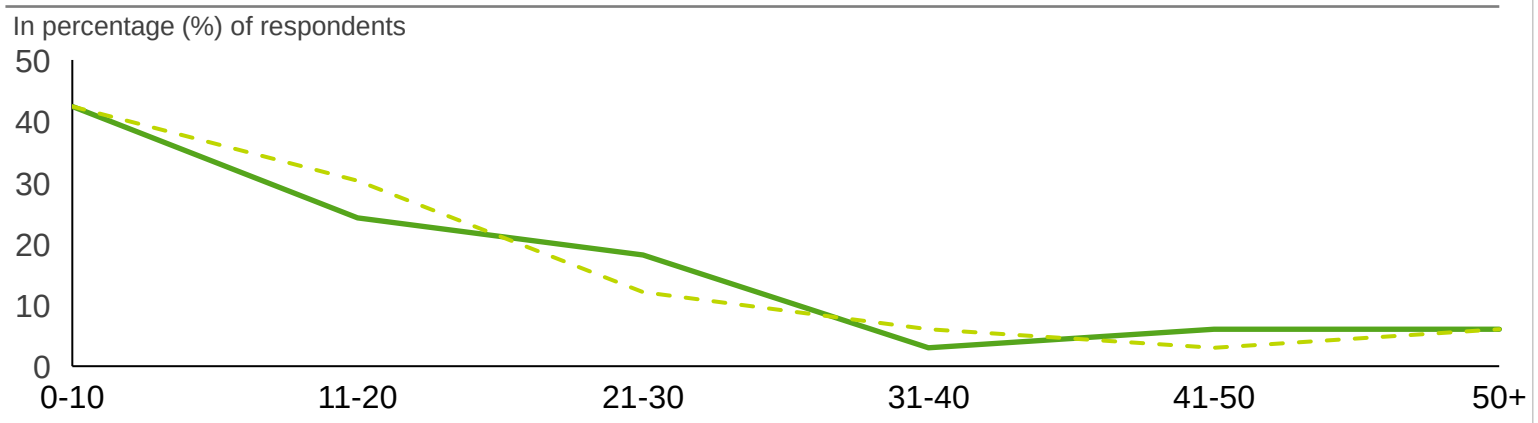
THANK YOU

SCM SUPPLY CHAIN MANAGEMENT

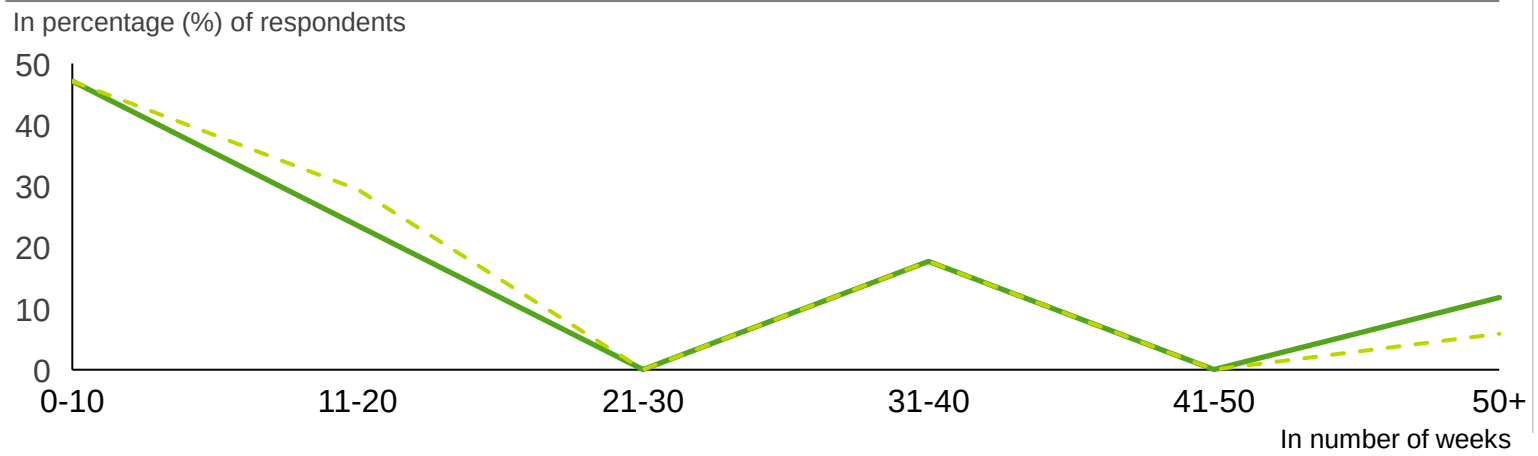
MATERIALS AND EQUIPMENT DEEP-DIVES

Supply Chain Health Assessment – Chemicals & Solids

Lead times to deliver product to customer (in weeks), n = 33, 33

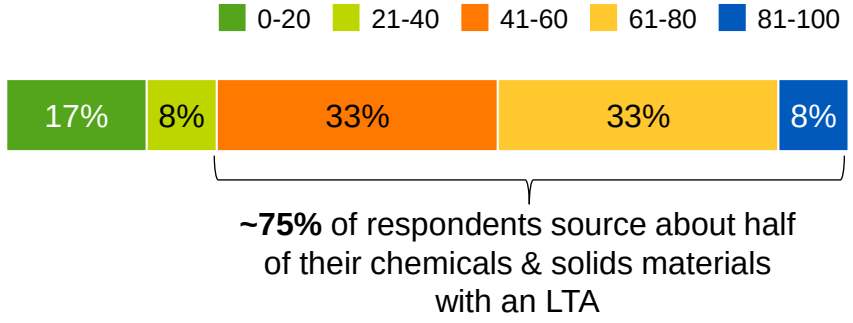


Lead times across input materials (in weeks), n = 17, 17



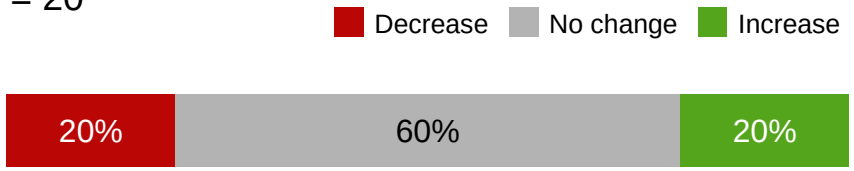
Majority of respondents have chemical and gases materials covered under LTAs…

Percent of materials covered under LTA, n = 12



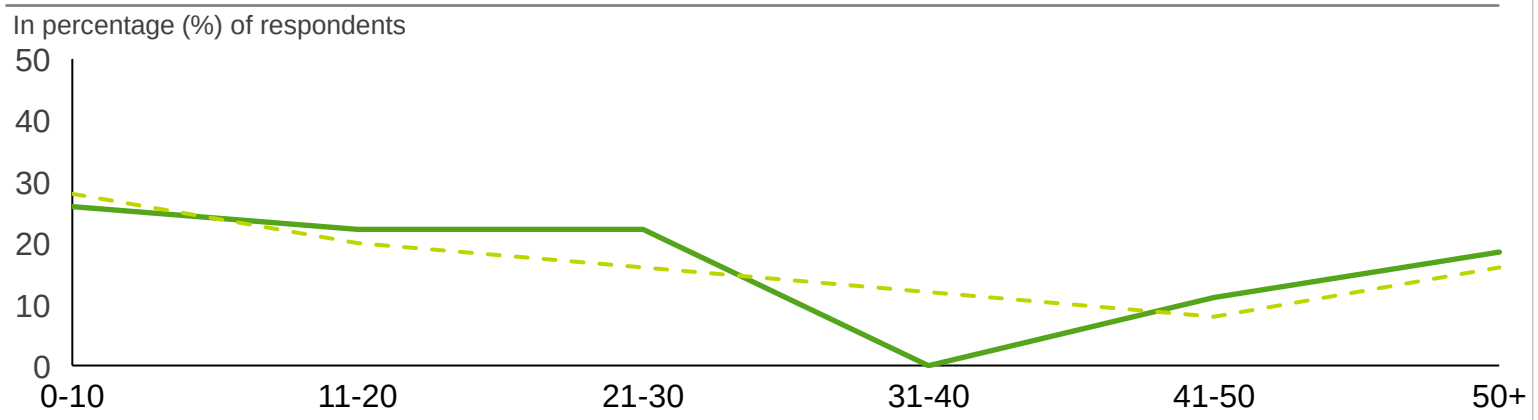
… and respondents experienced a mix of supplier commit responses, with a majority experiencing no change

n = 20

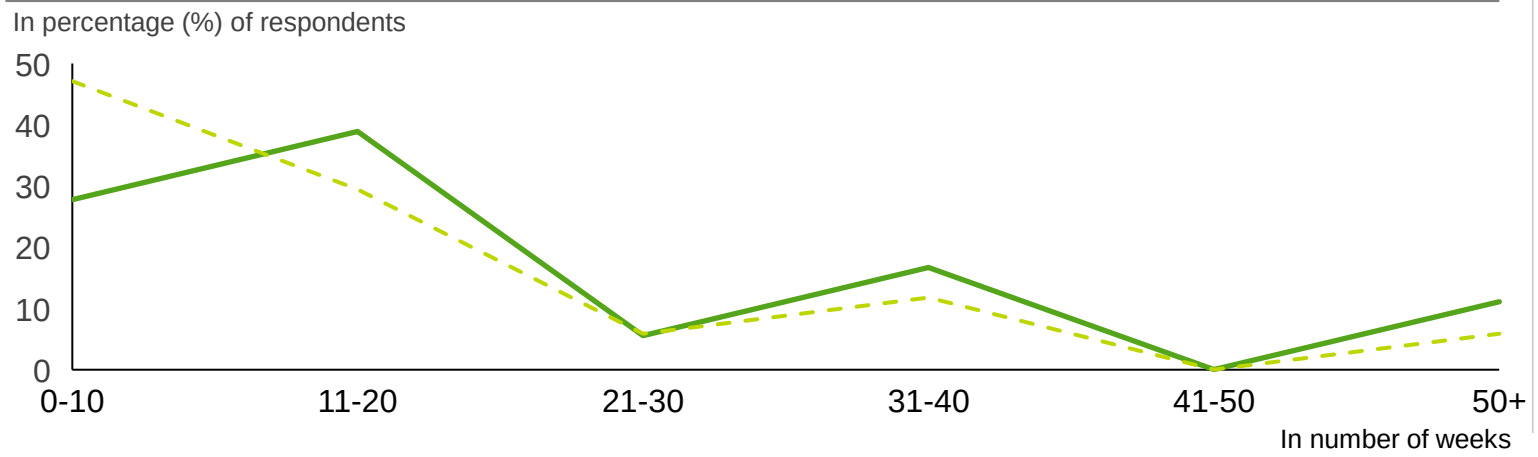


Supply Chain Health Assessment – Assembly

Lead times to deliver product to customer (in weeks), n = 27, 25

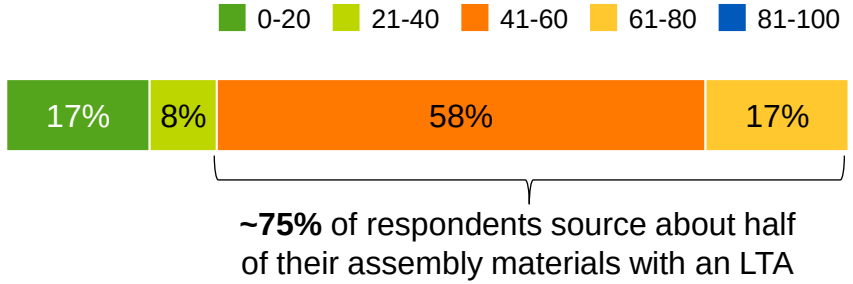


Lead times across input materials (in weeks), n = 18, 17

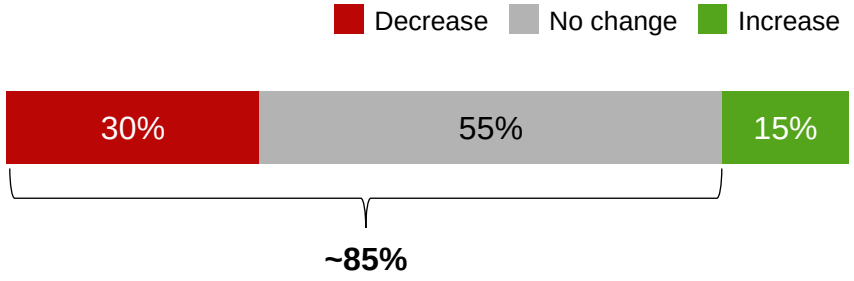


Majority of respondents have assembly materials covered under LTAs…

Percent of materials covered under LTA, n = 12

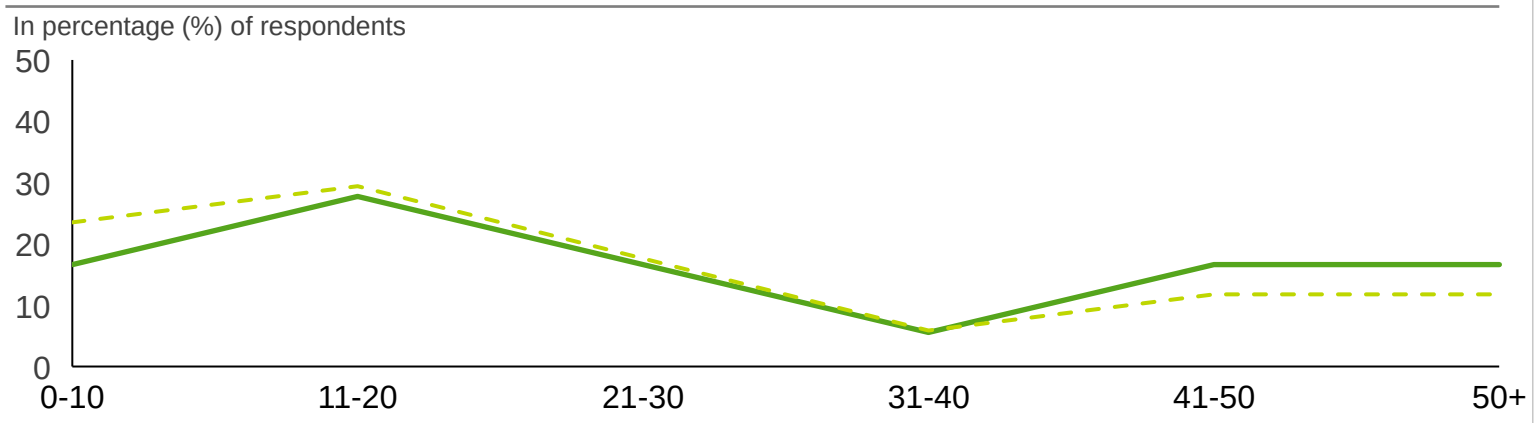


… and majority respondents experienced supplier commits remaining consistent or decreasing
n = 20

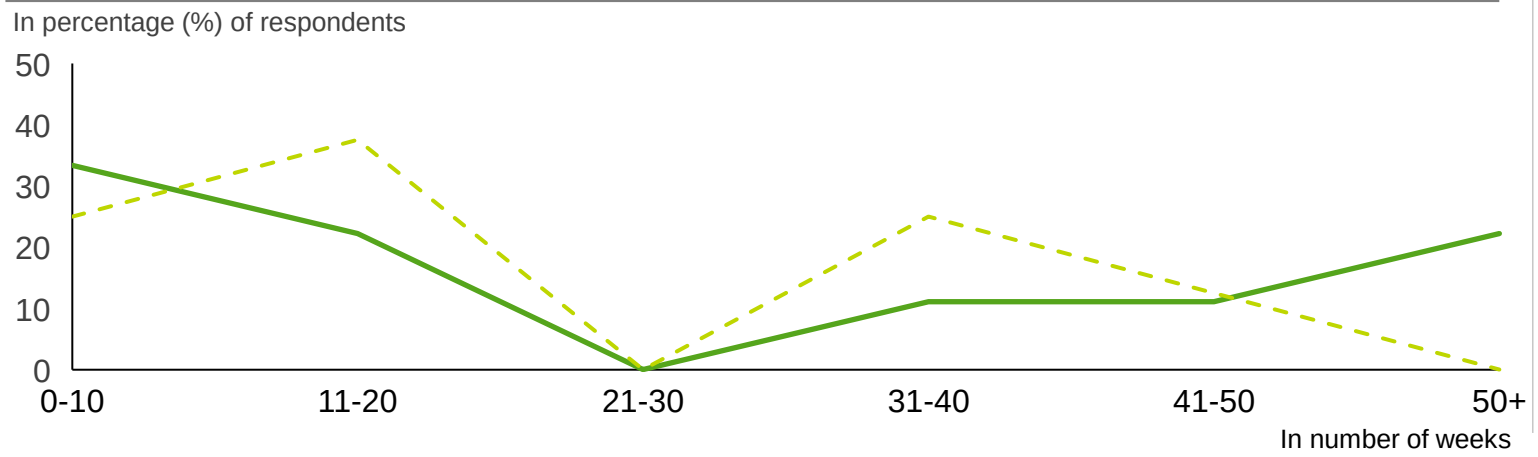


Supply Chain Health Assessment – Nanotechnology

Lead times to deliver product to customer (in weeks), n = 18, 17

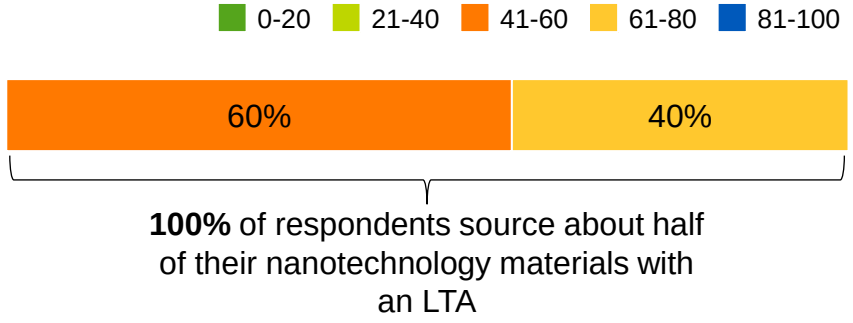


Lead times across input materials (in weeks), n = 9, 8

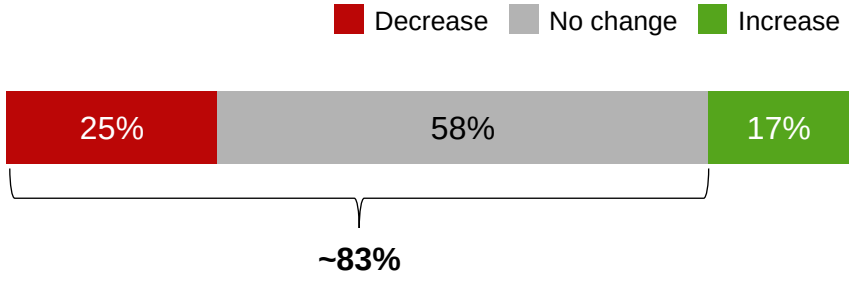


Majority of respondents have nanotechnology materials covered under LTAs…

Percent of materials covered under LTA, n = 5

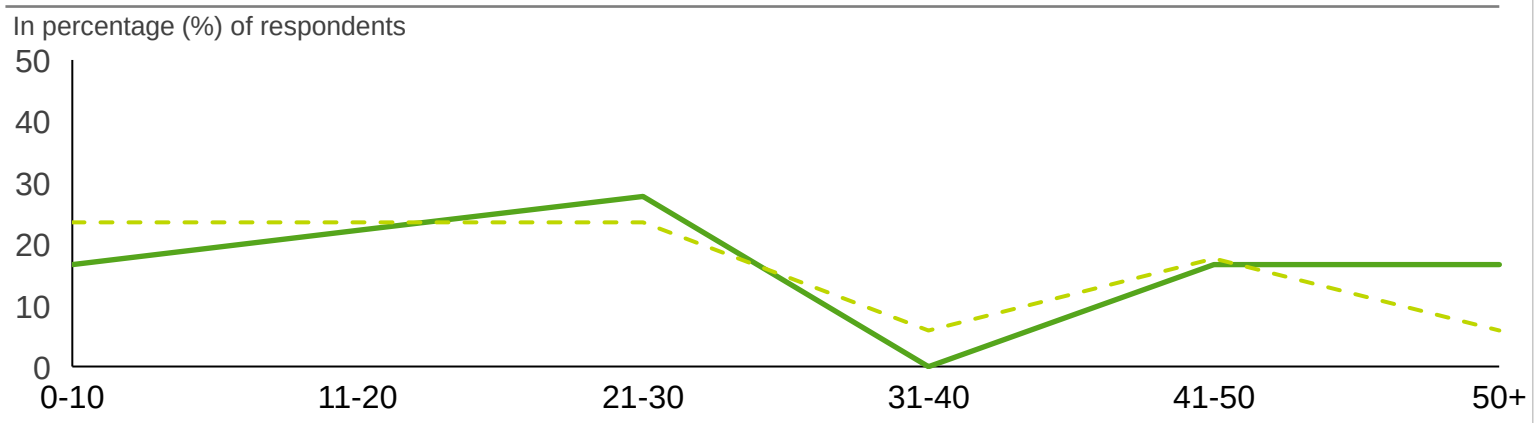


… and majority respondents experienced supplier commits remaining consistent or decreasing
n = 12

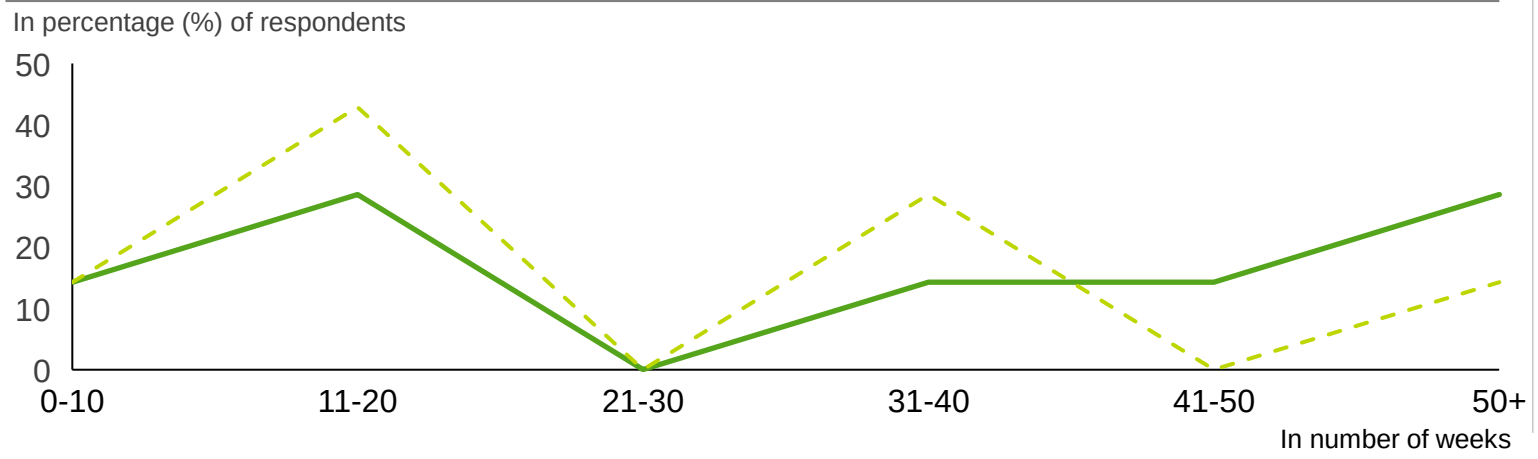


Supply Chain Health Assessment – FPD

Lead times to deliver product to customer (in weeks), n = 18, 17

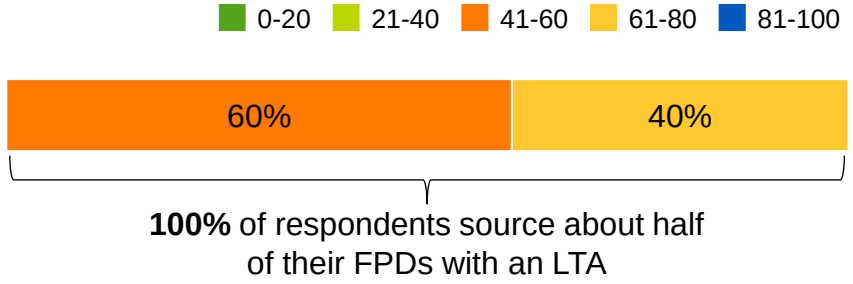


Lead times across input materials (in weeks), n = 7, 7



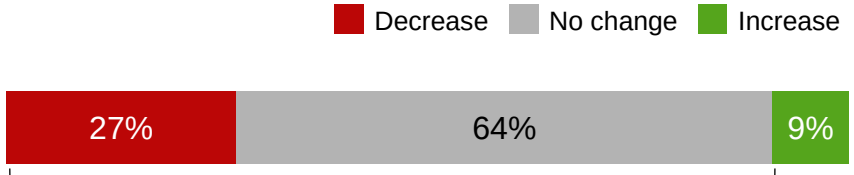
Majority of respondents have FPD materials covered under LTAs…

Percent of materials covered under LTA, n = 5



100% of respondents source about half of their FPDs with an LTA

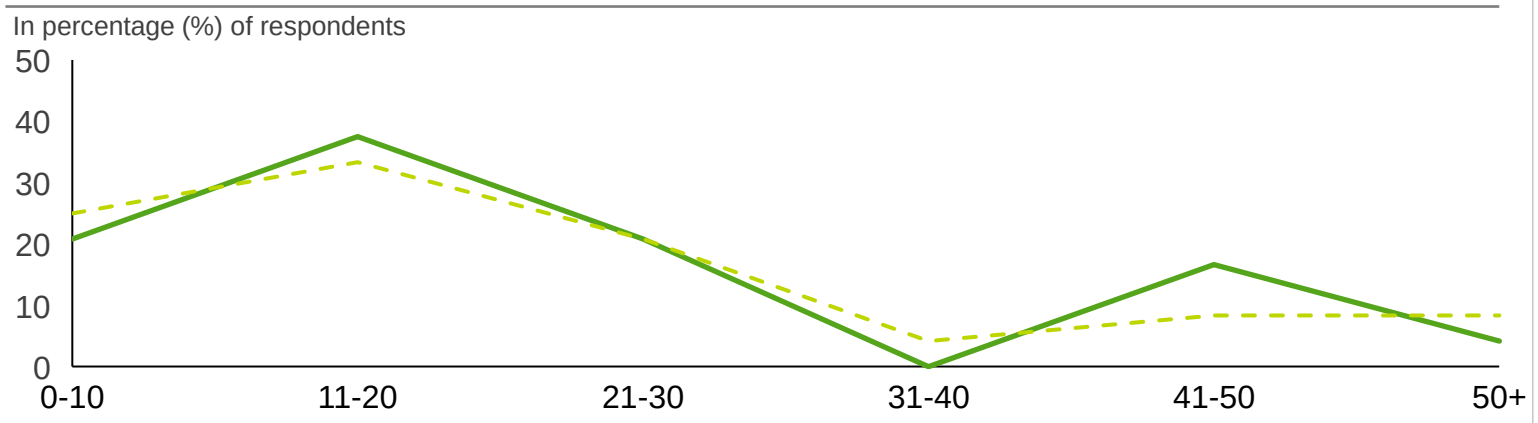
… and majority respondents experienced supplier commits remaining consistent or decreasing
n = 11



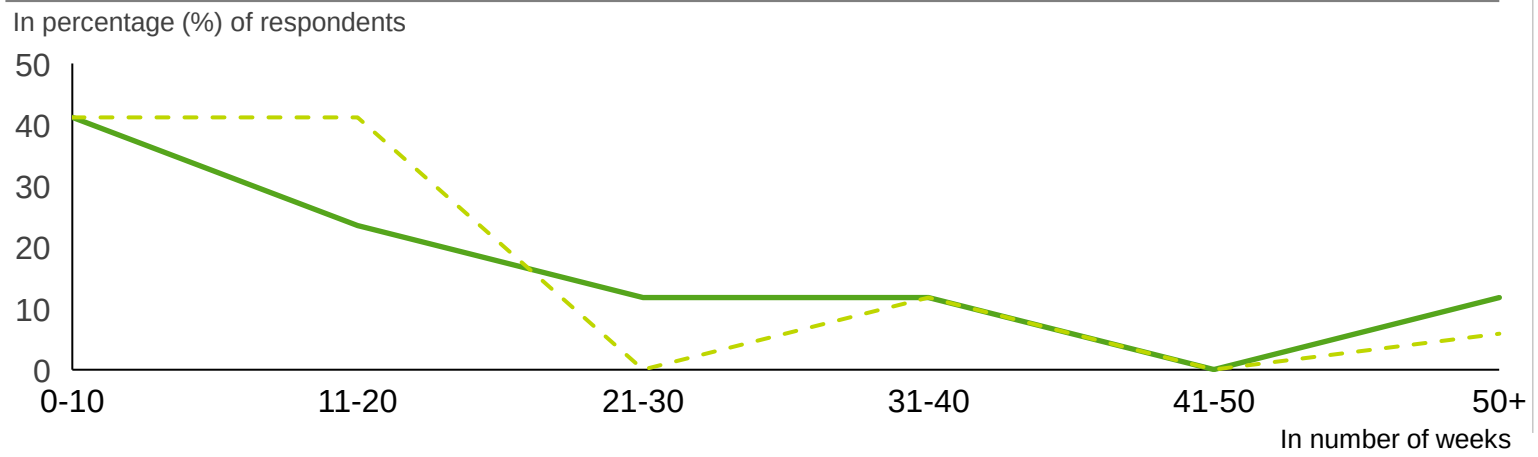
~91%

Supply Chain Health Assessment – Gases

Lead times to deliver product to customer (in weeks), n = 24, 24

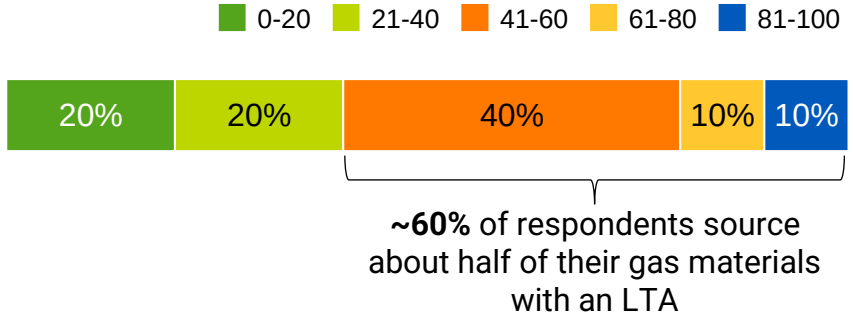


Lead times across input materials (in weeks), n = 17, 17

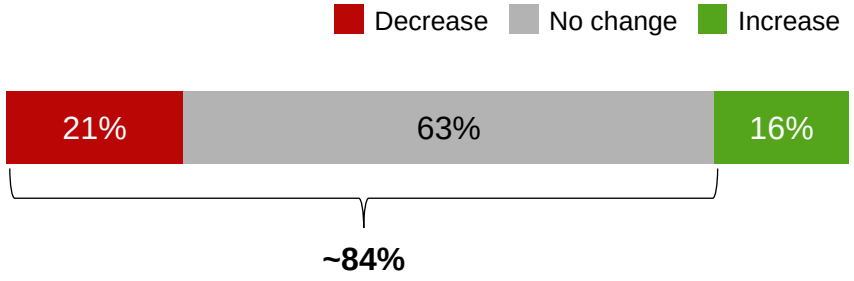


Majority of respondents have gases materials covered under LTAs…

Percent of materials covered under LTA, n = 5

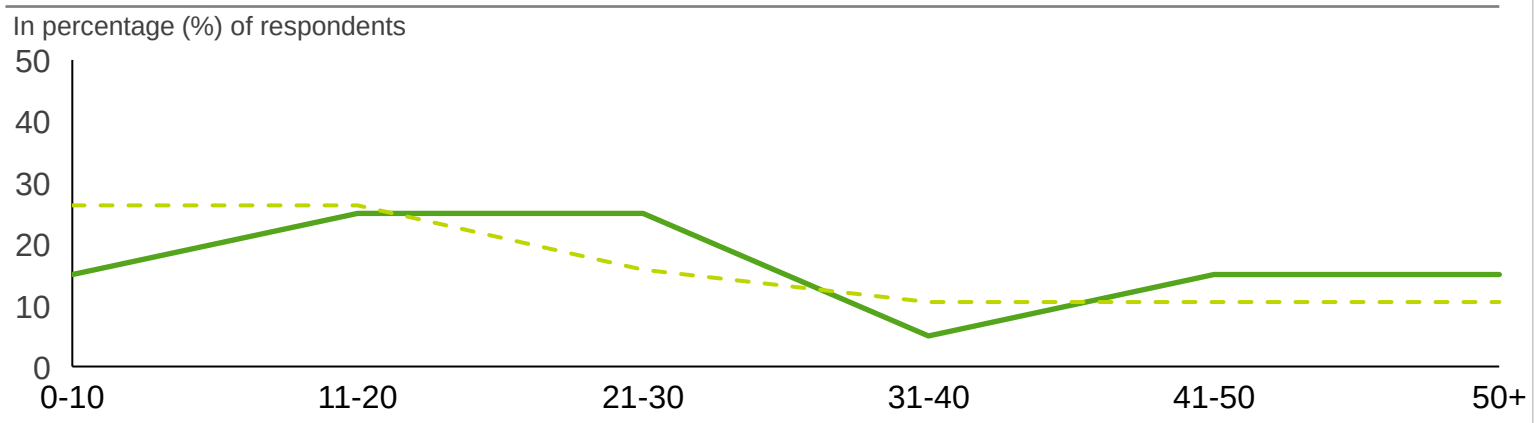


… and majority respondents experienced supplier commits remaining consistent or decreasing
n = 19

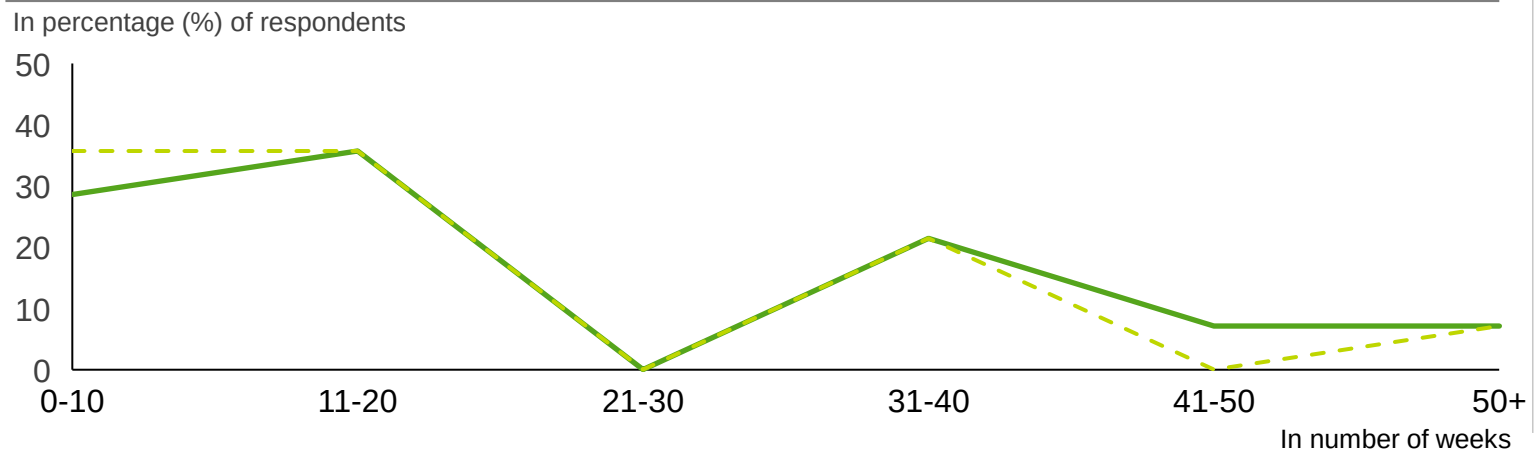


Supply Chain Health Assessment – Testing

Lead times to deliver product to customer (in weeks), n = 20, 19

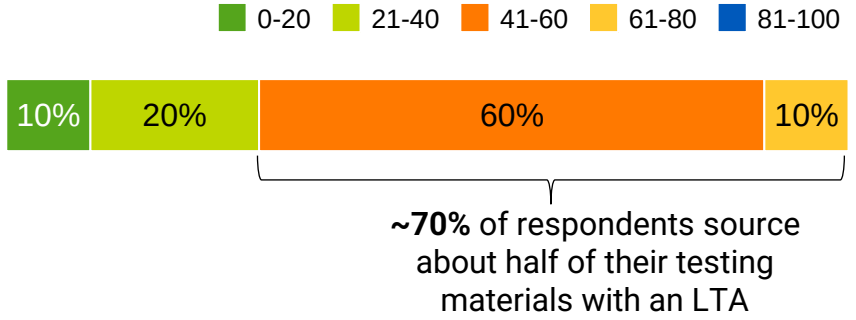


Lead times across input materials (in weeks), n = 14, 14

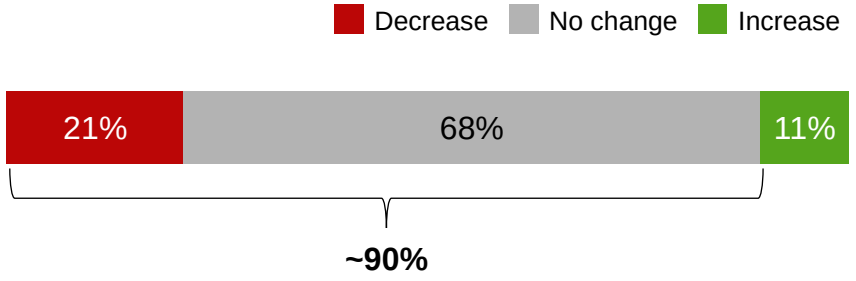


Majority of respondents have testing materials covered under LTAs…

Percent of materials covered under LTA, n = 10

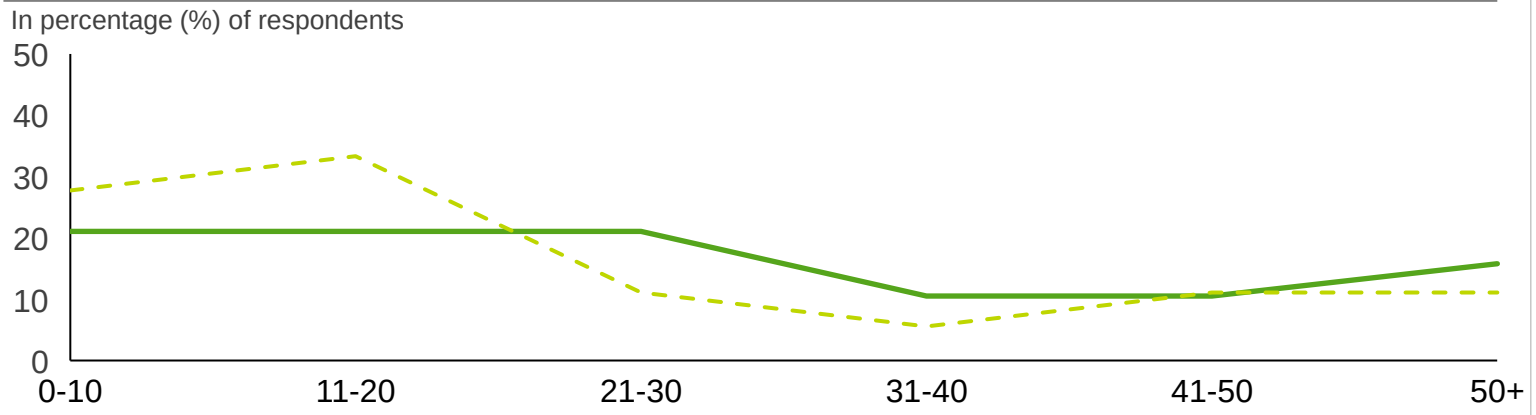


… and majority respondents experienced supplier commits remaining consistent or decreasing
n = 19

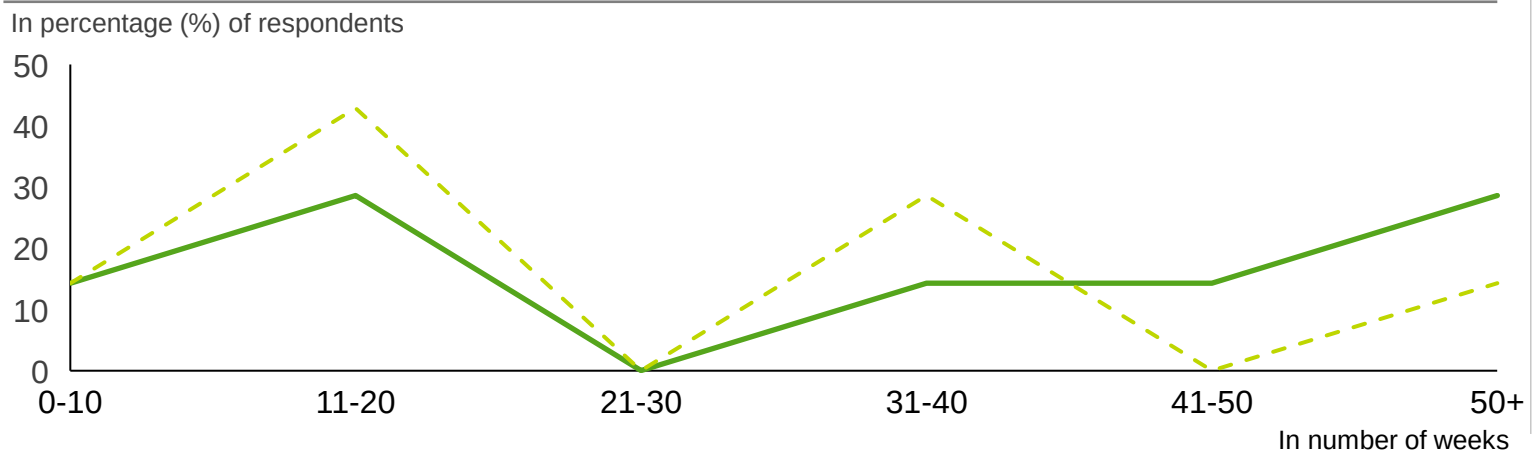


Supply Chain Health Assessment – Photovoltaic

Lead times to deliver product to customer (in weeks), n = 19, 18

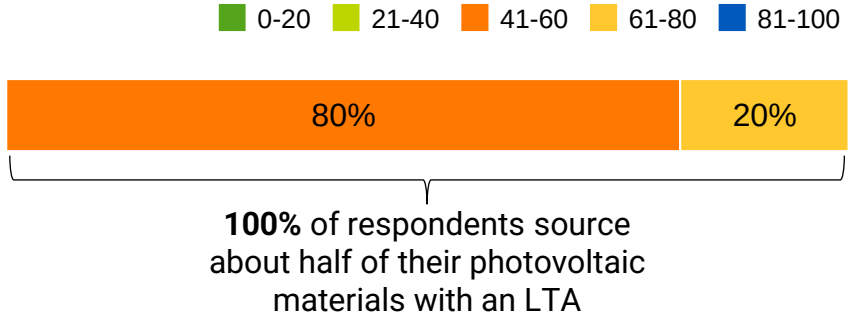


Lead times across input materials (in weeks), n = 7, 7

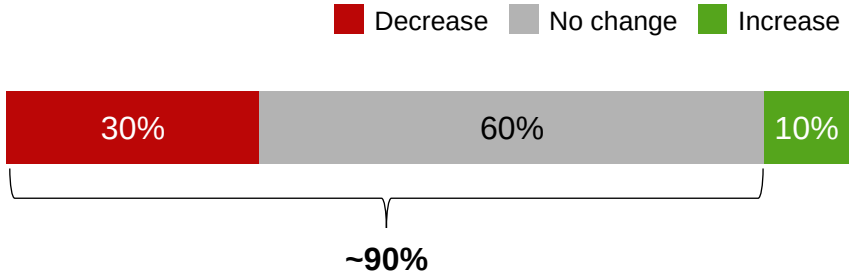


All respondents reported having half or more photovoltaic materials covered under LTAs…

Percent of materials covered under LTA, n = 5

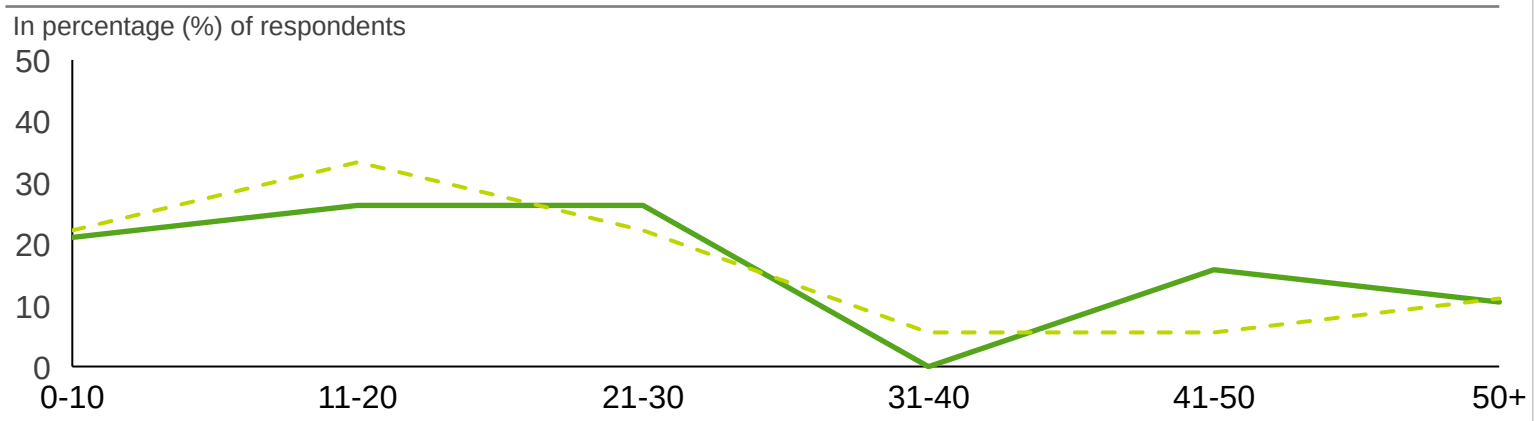


… and majority respondents experienced supplier commits remaining consistent or decreasing
n = 10

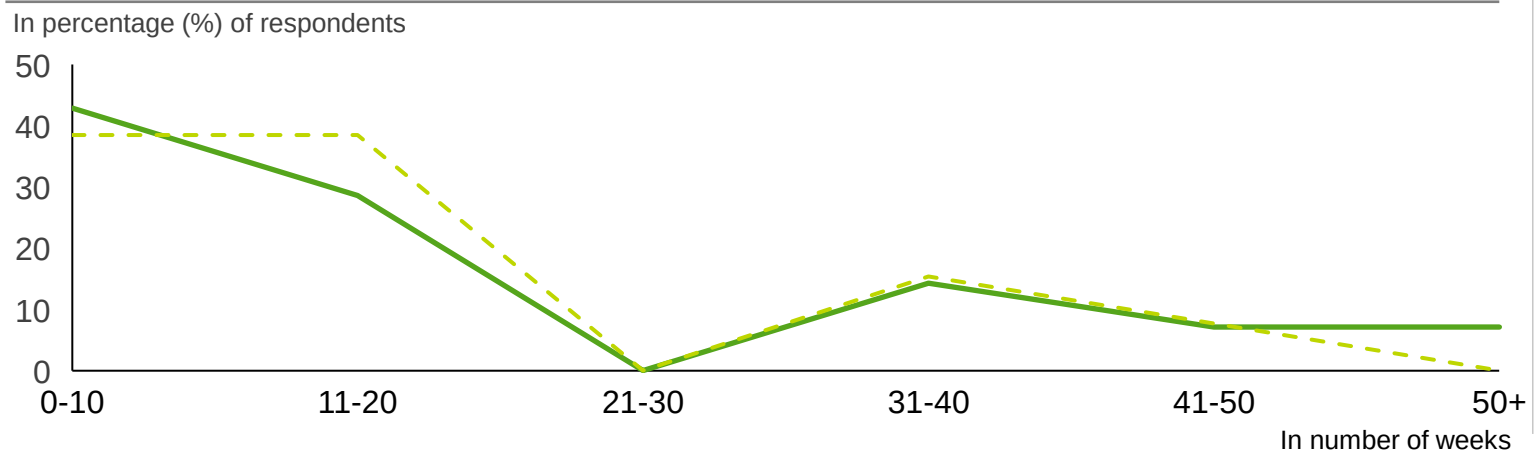


Supply Chain Health Assessment – Mask making

Lead times to deliver product to customer (in weeks), n = 19, 18

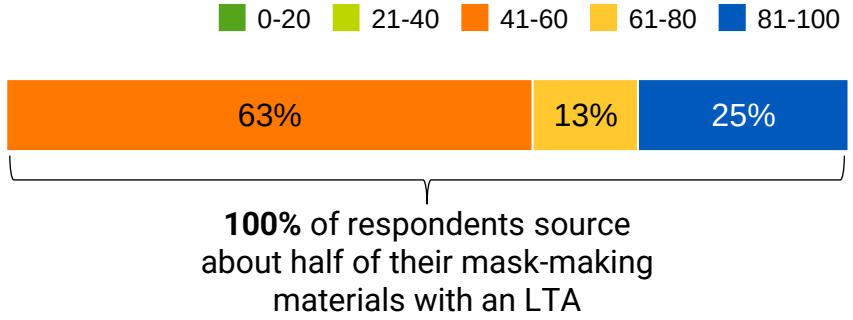


Lead times across input materials (in weeks), n = 14, 13



All respondents reported having half or more of photovoltaic materials covered under LTAs…

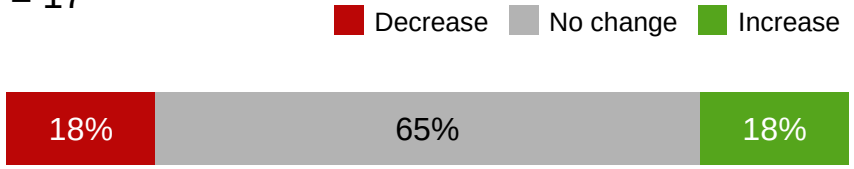
Percent of materials covered under LTA, n = 8



100% of respondents source about half of their mask-making materials with an LTA

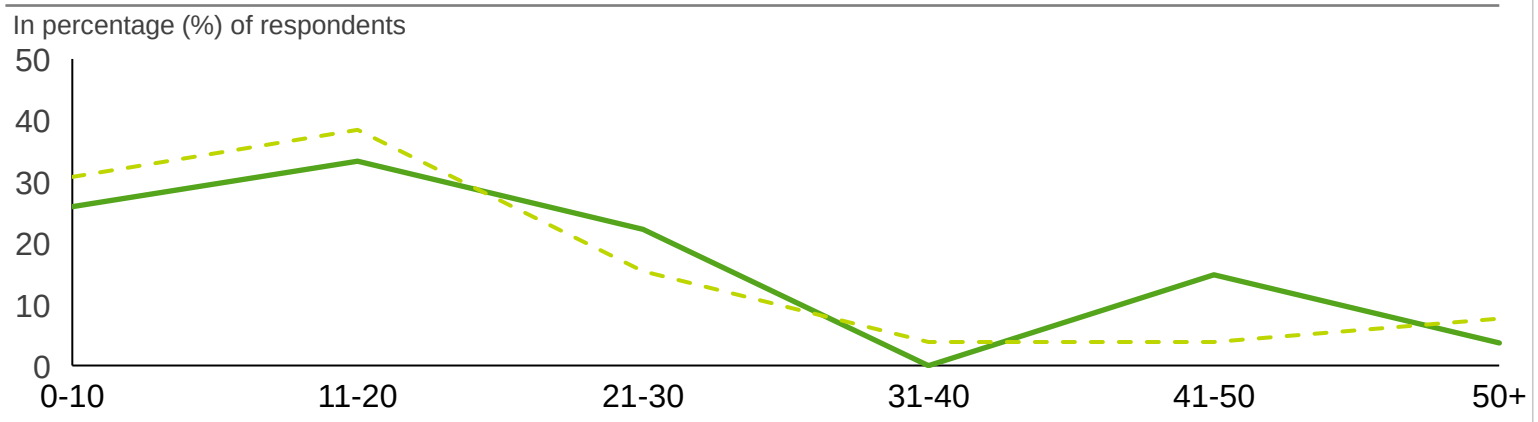
… and respondents experienced a mix of supplier commit responses, with a majority experiencing no change

n = 17

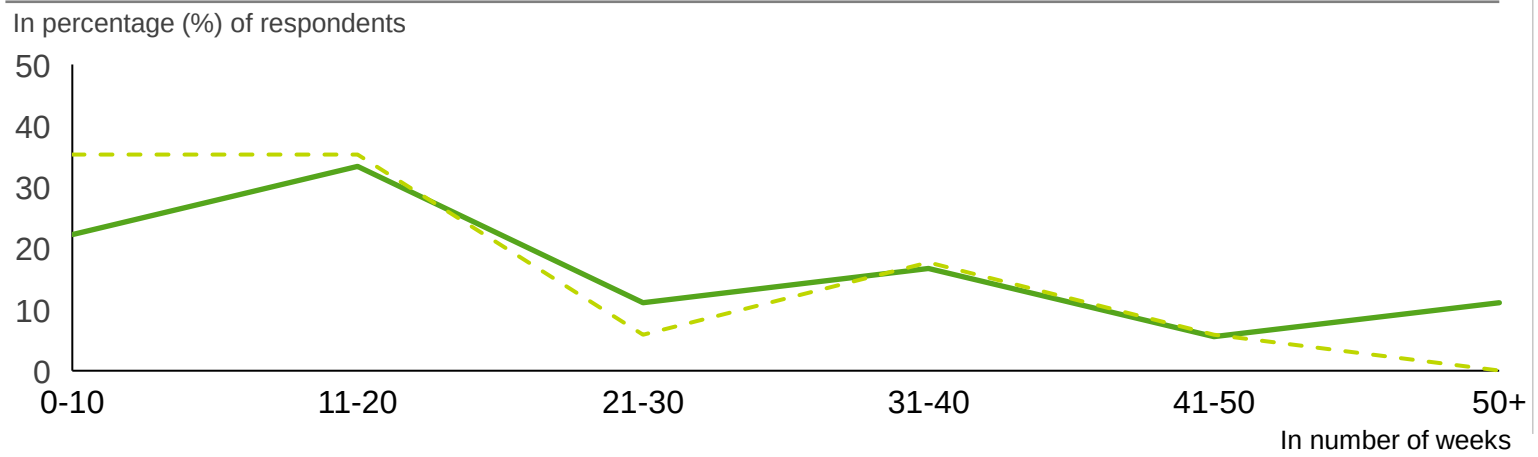


Supply Chain Health Assessment – Substrate

Lead times to deliver product to customer (in weeks), n = 27, 26

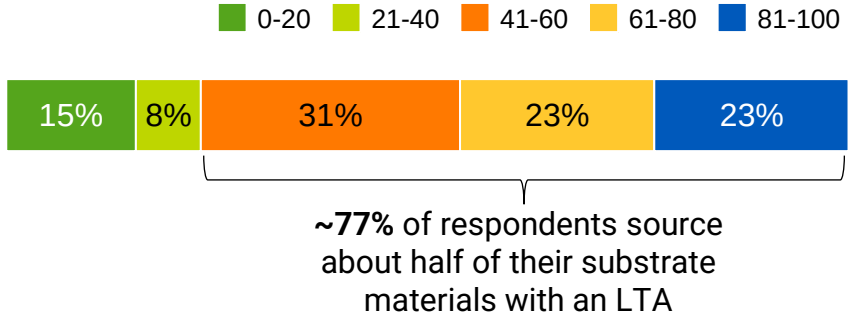


Lead times across input materials (in weeks), n = 18, 17



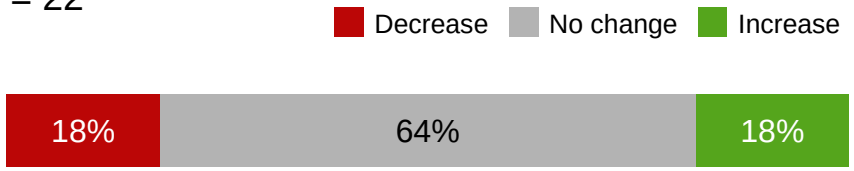
Majority of respondents have substrates covered under LTAs…

Percent of materials covered under LTA, n = 13



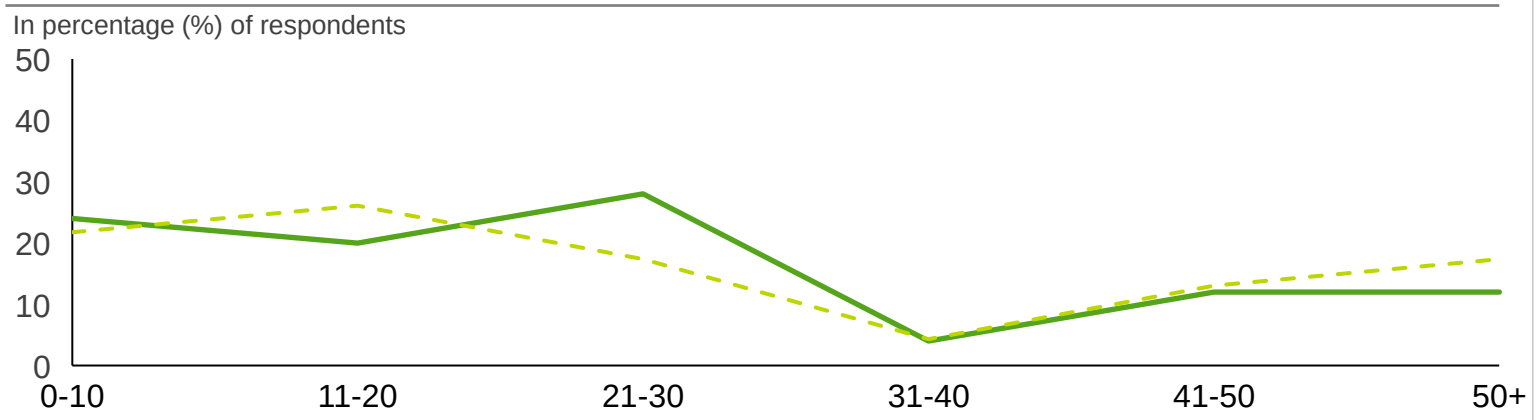
… and respondents experienced a mix of supplier commit responses, with a majority experiencing no change

n = 22

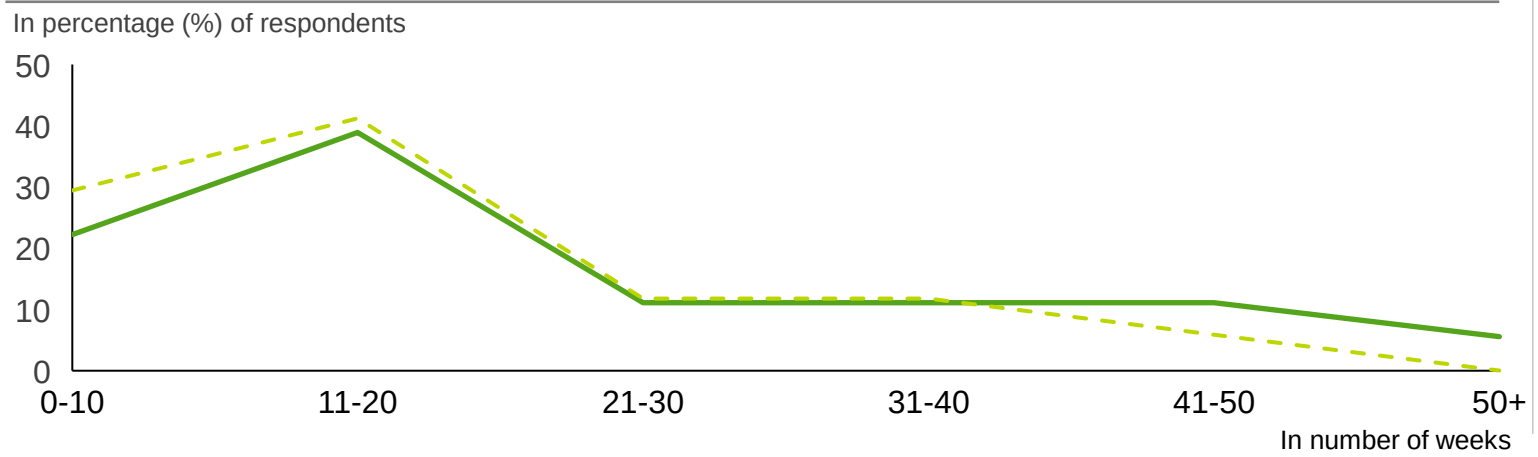


Supply Chain Health Assessment – Process

Lead times to deliver product to customer (in weeks), n = 25, 23

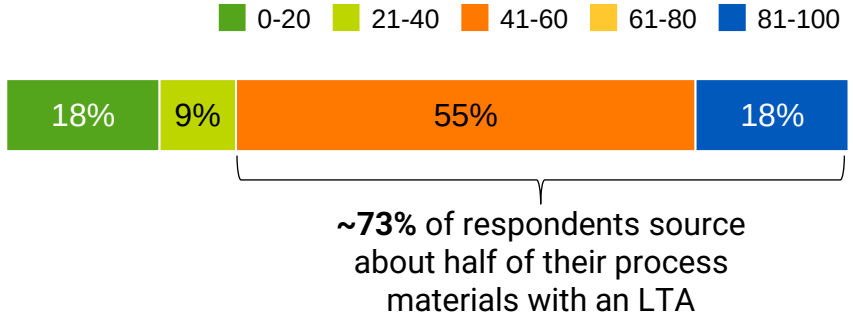


Lead times across input materials (in weeks), n = 18, 17



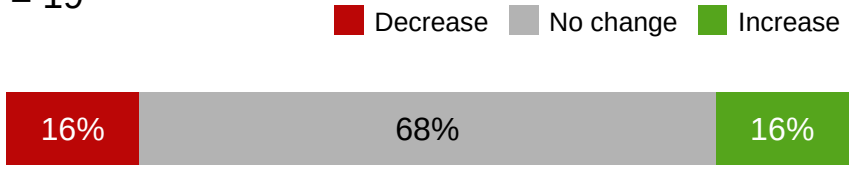
Majority of respondents have process materials covered under LTAs…

Percent of materials covered under LTA, n = 11



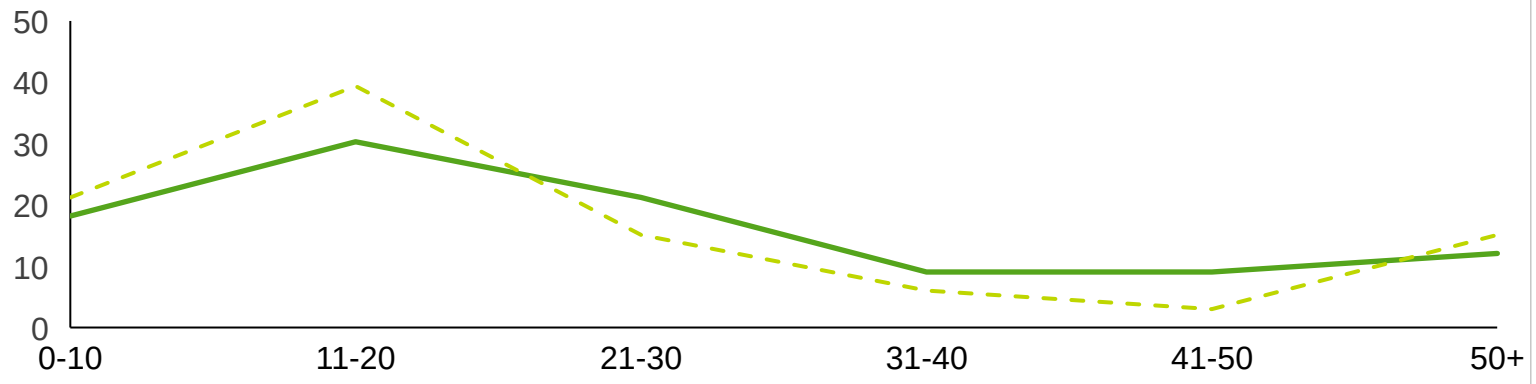
… and respondents experienced a mix of supplier commit responses, with a majority experiencing no change

n = 19

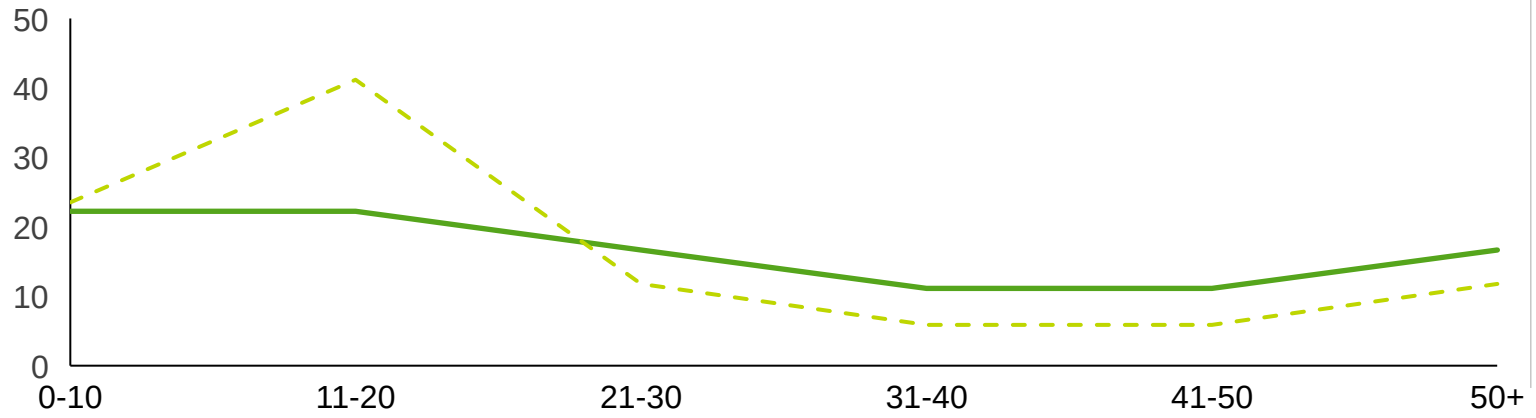


Supply Chain Health Assessment – Assembly & Packaging

Lead times to deliver product to customer (in weeks), n = 33

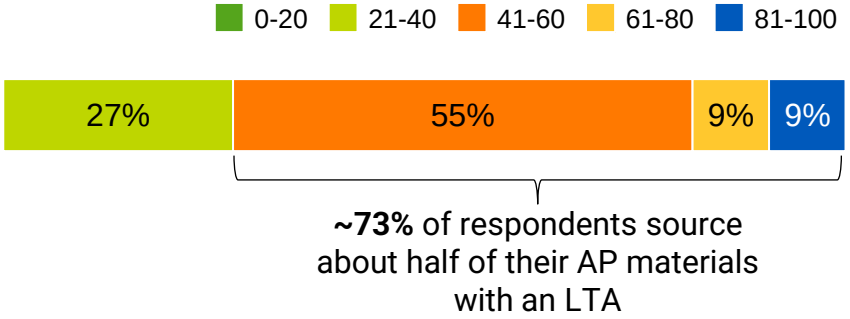


Lead times across input materials (in weeks), n = 18, 17



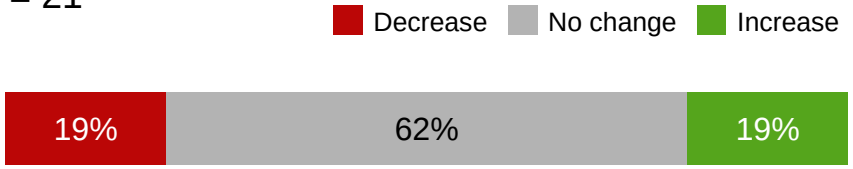
Majority of respondents have assembly and packaging materials under LTAs…

Percent of materials covered under LTA, n = 11



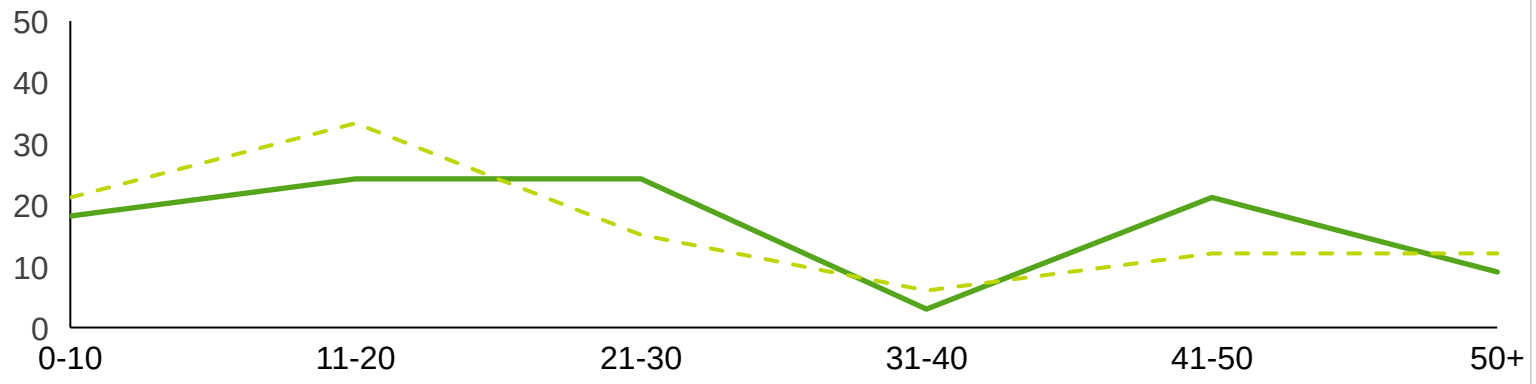
… and respondents experienced a mix of supplier commit responses, with a majority experiencing no change

n = 21

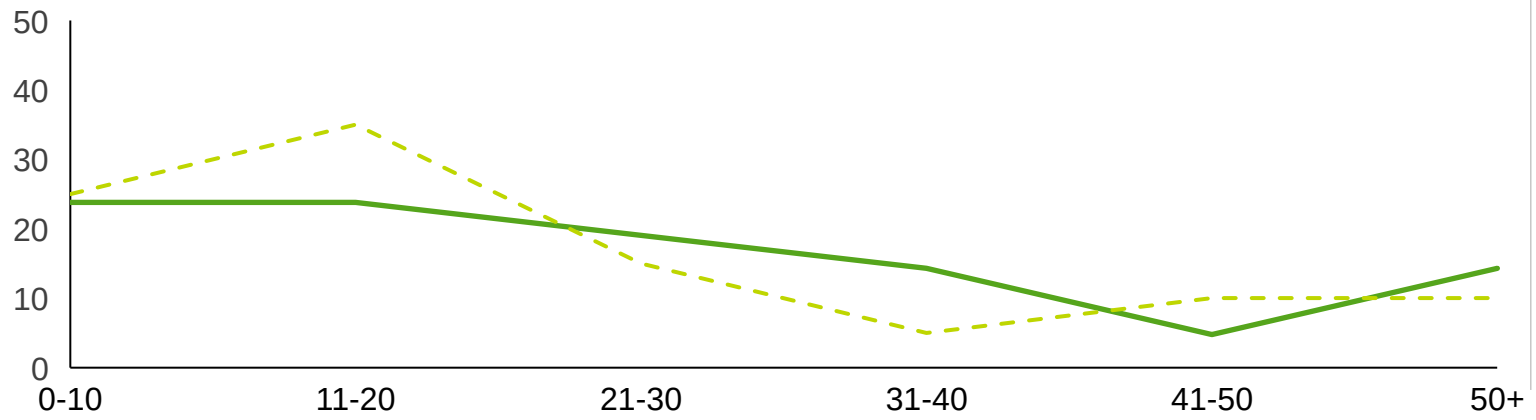


Supply Chain Health Assessment – Test

Lead times to deliver product to customer (in weeks), n = 31, 31

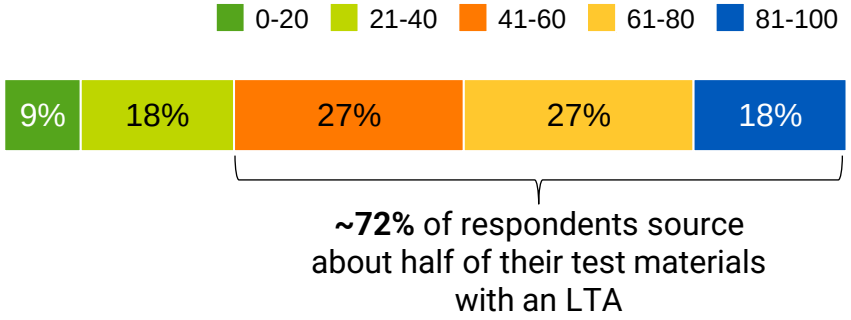


Lead times across input materials (in weeks), n = 21, 20



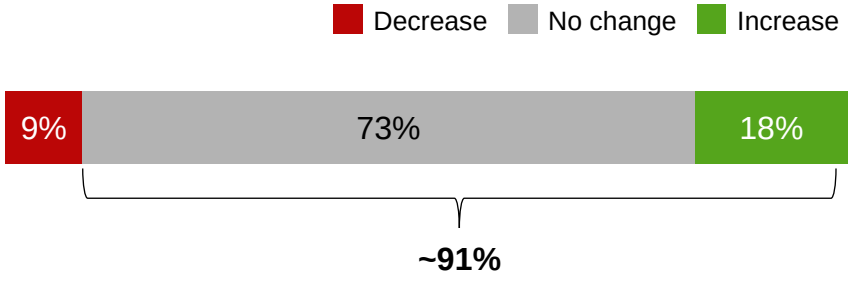
Majority of respondents have test materials covered under LTAs…

Percent of materials covered under LTA, n = 11



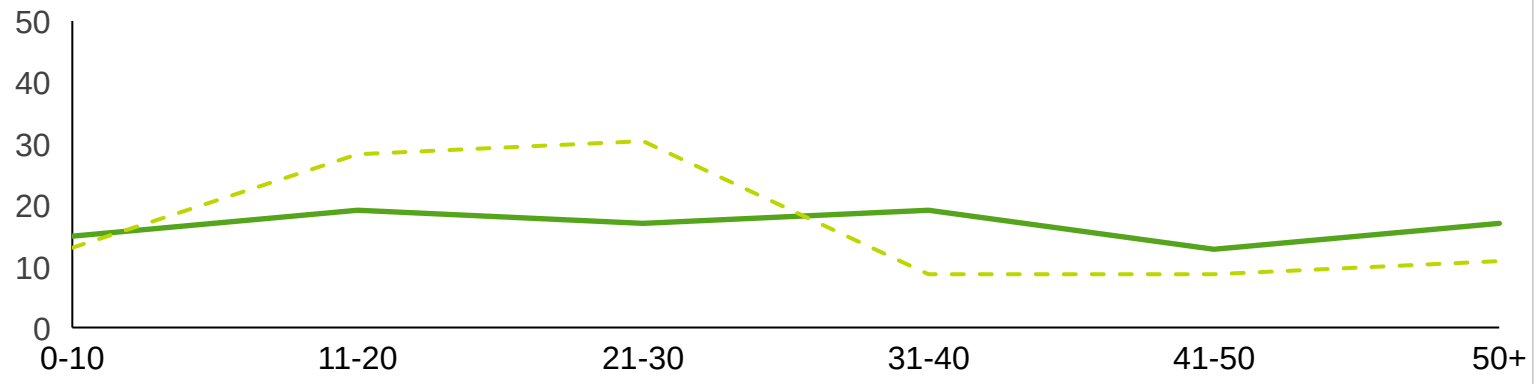
… and majority respondents experienced supplier commits remaining the same or increasing

n = 22

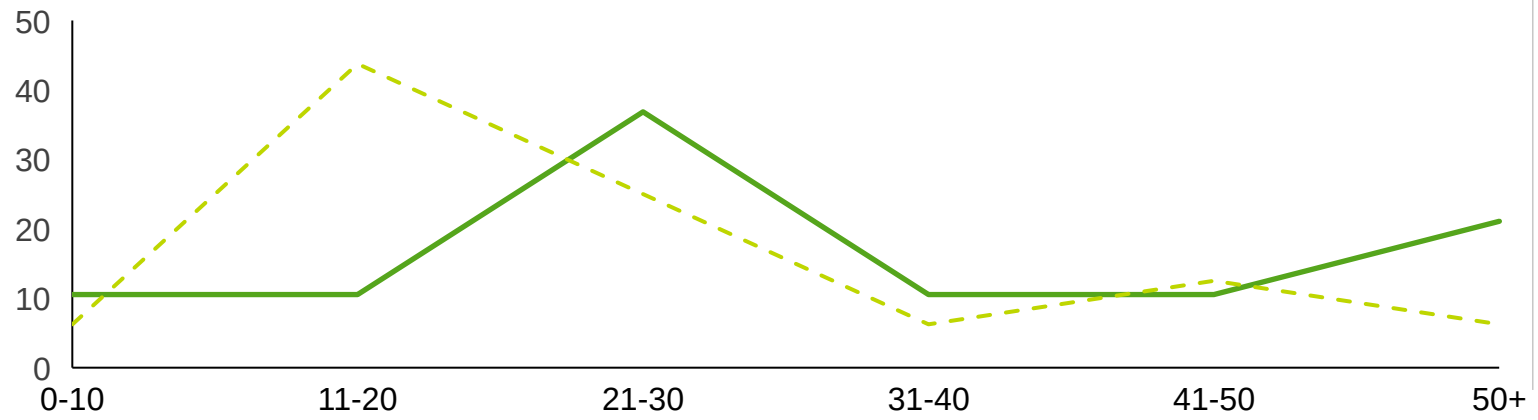


Supply Chain Health Assessment – Front-End

Lead times to deliver product to customer (in weeks), n = 47, 46

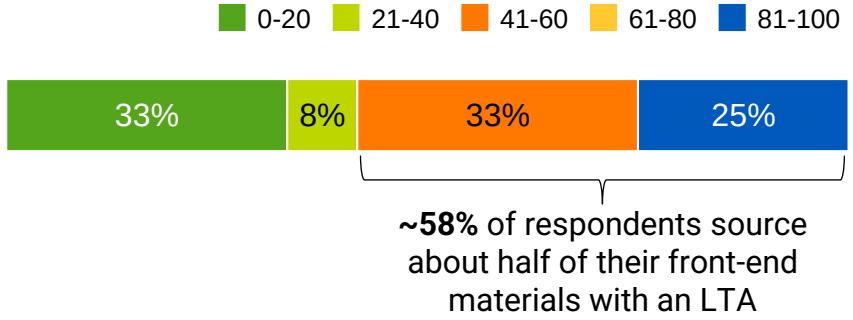


Lead times across input materials (in weeks), n = 19, 16



Majority of respondents have front-end materials covered under LTAs…

Percent of materials covered under LTA, n = 12



… and majority respondents experienced supplier commits remaining consistent or increasing
n = 24