CONSTRUCTION EQUIPMENT®

SURVEY OF STATE-OF-THE-ART TECHNOLOGY IN THE CONSTRUCTION INDUSTRY

JANUARY 2017

Conducted by
Scranton Gillette Communications/SGC Horizon Research Services

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COMMUNICATIONS
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PURPOSE AND METHODOLOGY

PURPOSE

To learn from those involved in the construction industry about state-of-the-art management tools introduced to the marketplace and used to streamline project management, help to compete for projects, and to stay within budget and improve margins.

METHODOLOGY

1. A core questionnaire was delivered digitally via the survey mechanism *Question Pro* in September 2016 with the survey sent four times to ensure a projectable response level. The survey was sent to those subscribers to *Construction Equipment* with fleet replacement values of $5 million or more along with contractors from the subscriber list of *Roads & Bridges*, building contractors from *Building Design & Construction*, and those involved in water infrastructure construction from the list of *Water and Wastes Digest*, *Storm Water Solutions*, and *Water Quality Products*.

2. A second, supplemental questionnaire was sent in early December 2016. The purpose of this questionnaire was to obtain additional information about data that responders firms collect about their fleets.

3. A "cover email" was sent over the signature of Rod Sutton, Editorial Director, *Construction Equipment*.

4. An incentive was provided. Respondents were offered the opportunity to enter a drawing for one of three Virtual Reality goggles. In addition, responders will receive the results of the study to learn what how their industry colleagues are utilizing today's construction technology.

5. A total of 257 respondents opened the emails with 146 (56.8% of opens) answering all or parts of the survey and 101 completing the questionnaires in-full (69.1% of those starting the survey).

6. Appreciation and thanks to Case Construction Equipment for its partnership with *Construction Equipment* in presenting this analysis of technology in the construction industry.

SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Equipment users were asked about telematics capabilities with their fleets

- Sixty-one percent of respondents to the survey say their equipment fleets have telematics capabilities.

Category	Percentage
0%	39%
Less than 10%	28%
11-50%	17%
51-99%	15%
100%	1%
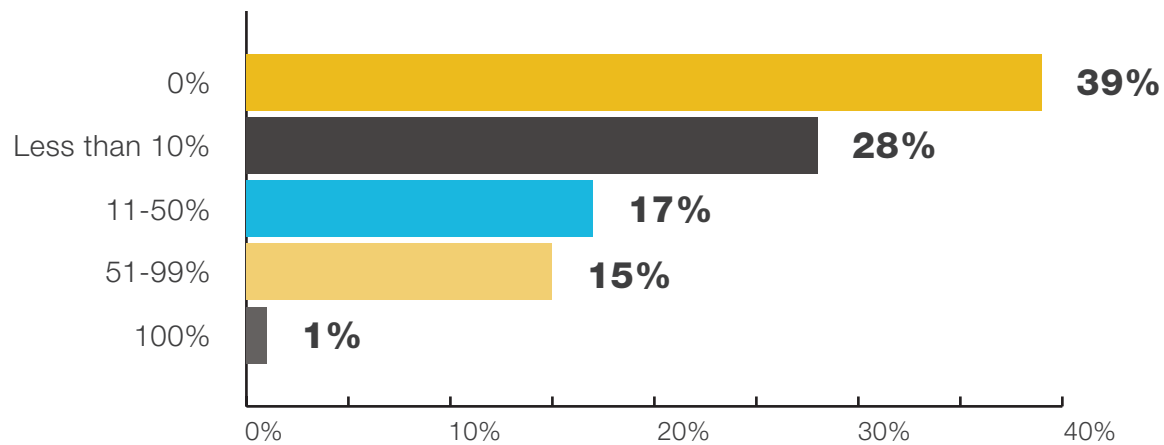
SUMMARY OF THE FINDINGS
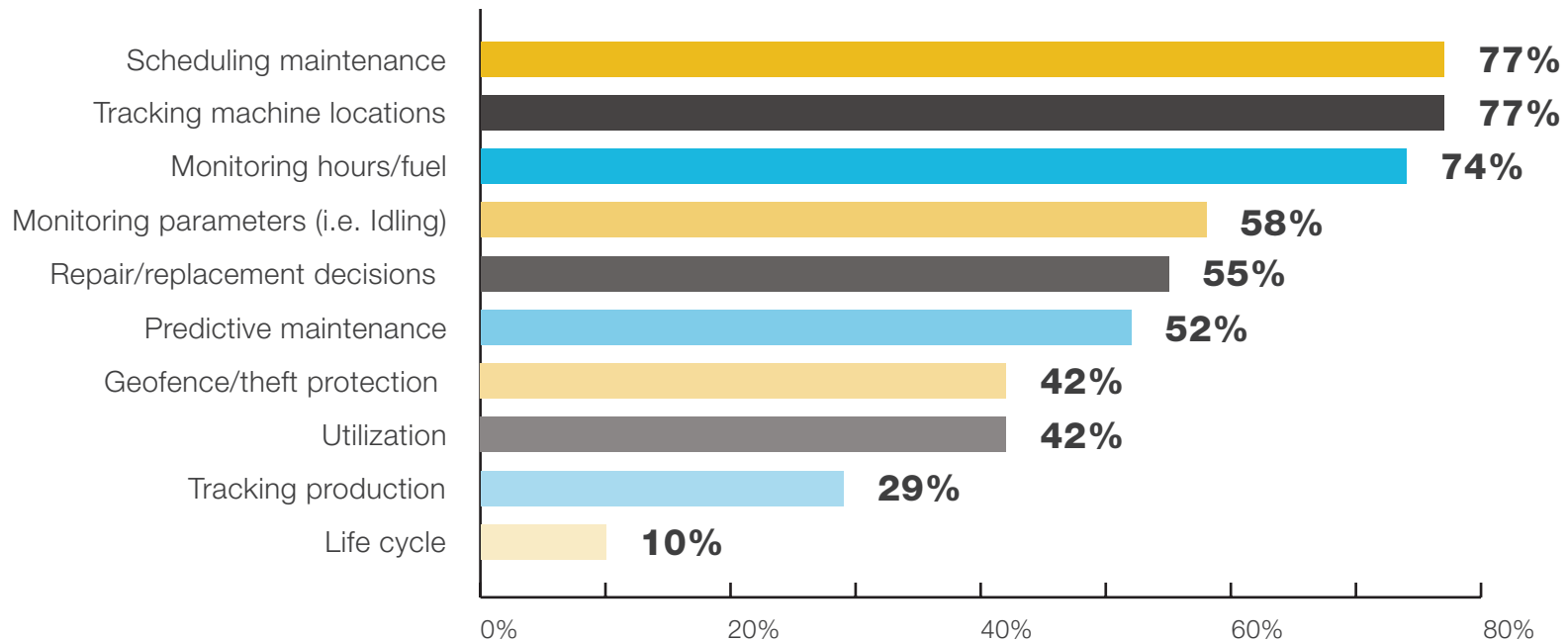
EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Users were asked if their equipment divisions/departments collect telematics data

- About one-third of respondents say they collect telematics data.
- In a supplemental questionnaire, users indicated that an additional 32 percent have their dealers monitor data for them.

SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

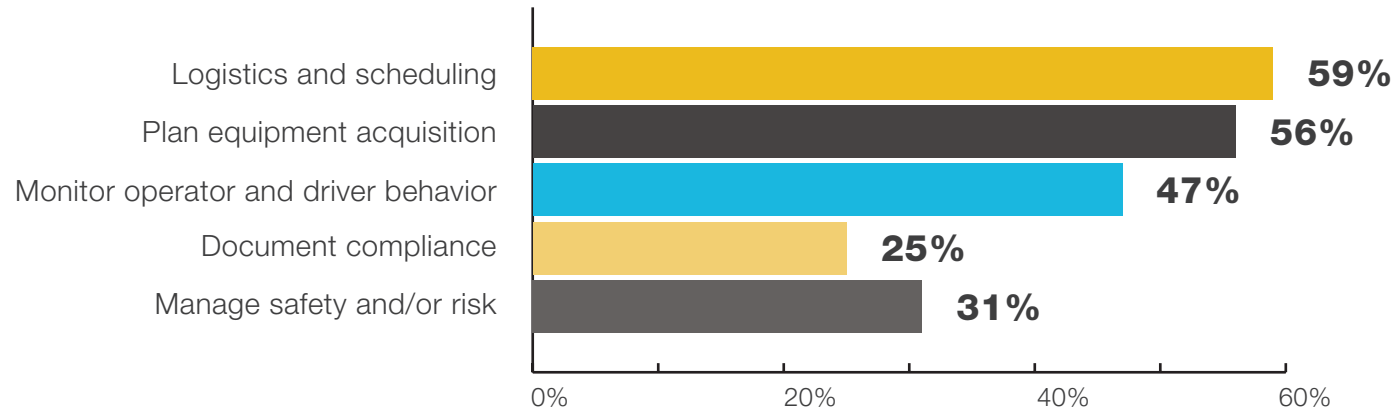*Those who use telematics data were asked how they use the data.*

Use	Percentage
Scheduling maintenance	77%
Tracking machine locations	77%
Monitoring hours/fuel	74%
Monitoring parameters (i.e. Idling)	58%
Repair/replacement decisions	55%
Predictive maintenance	52%
Geofence/theft protection	42%
Utilization	42%
Tracking production	29%
Life cycle	10%

Other

"We have our own preventive maintenance program from which we make equipment decisions."
"Remote diagnostics."
"Fuel."

SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Are fleet data used elsewhere in the respondents' organizations and how is it used

• More than one-third of respondents (34%) say they use data elsewhere in their companies.

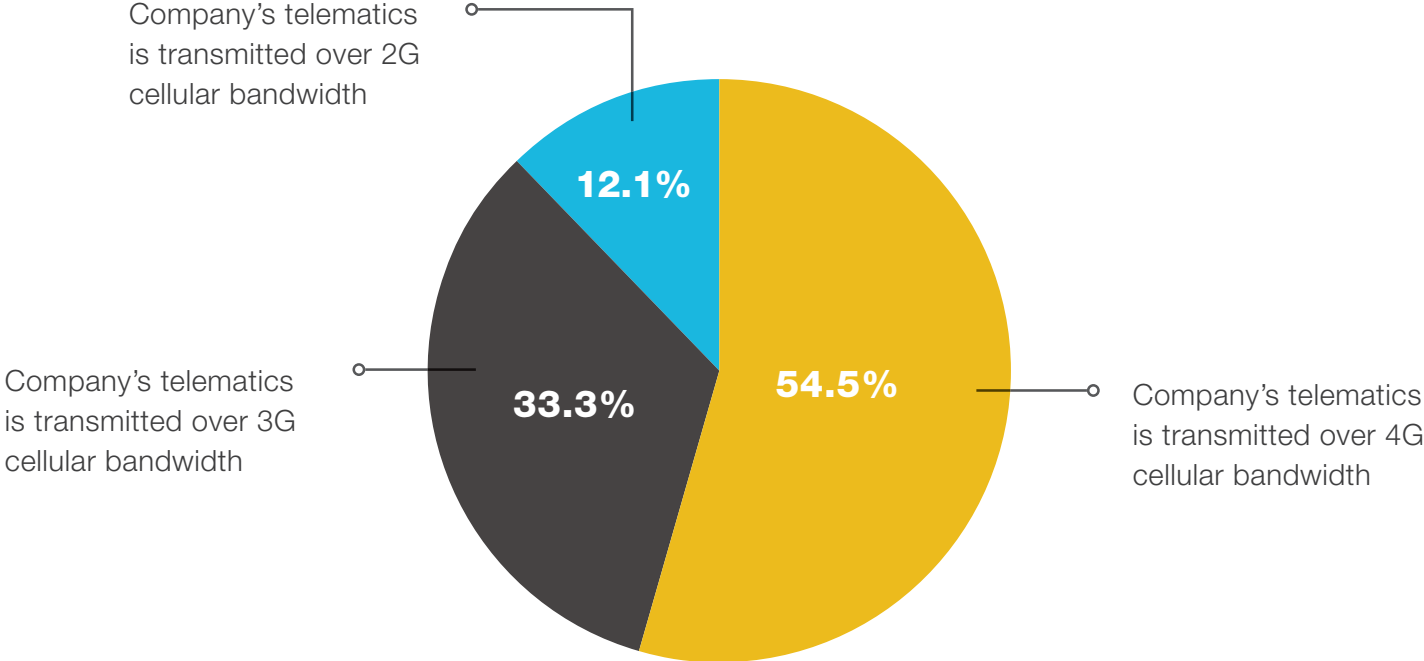| Category	Percentage
Logistics and scheduling	59%
Plan equipment acquisition	56%
Monitor operator and driver behavior	47%
Document compliance	25%
Manage safety and/or risk	31%

• Over one-third (34%) say equipment cost data is incorporated into estimating and job costing with 25 percent indicating that equipment dealers monitor their machines and advise respondents' companies.

SUMMARY OF THE FINDINGS

EQUIPMENT FLEETS AND THE USE OF TELEMATICS

Those surveyed were asked over what cellular bandwidth their is telematics transmitted

Company's telematics is transmitted over 2G cellular bandwidth

12.1%

Company's telematics is transmitted over 3G cellular bandwidth

33.3%

54.5%

Company's telematics is transmitted over 4G cellular bandwidth

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of Go Pro or comparable video recording devices and how they are used

Use Go Pro or similar recording devices

30%

Not using such devices

70%
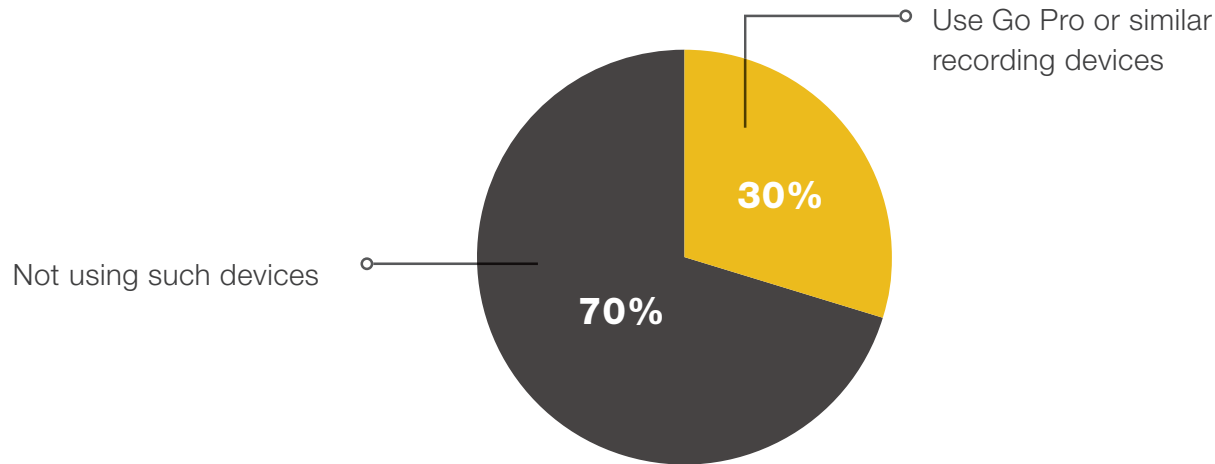
- To aid in site preparation and mapping (46%) and to monitor job sites are applications in which Go Pro and similar devices are used most.

- Other applications include inspecting infrastructure (bridges, pipelines, underground) to determine conditions, indicated by 31% and to inspect job sites (27%).
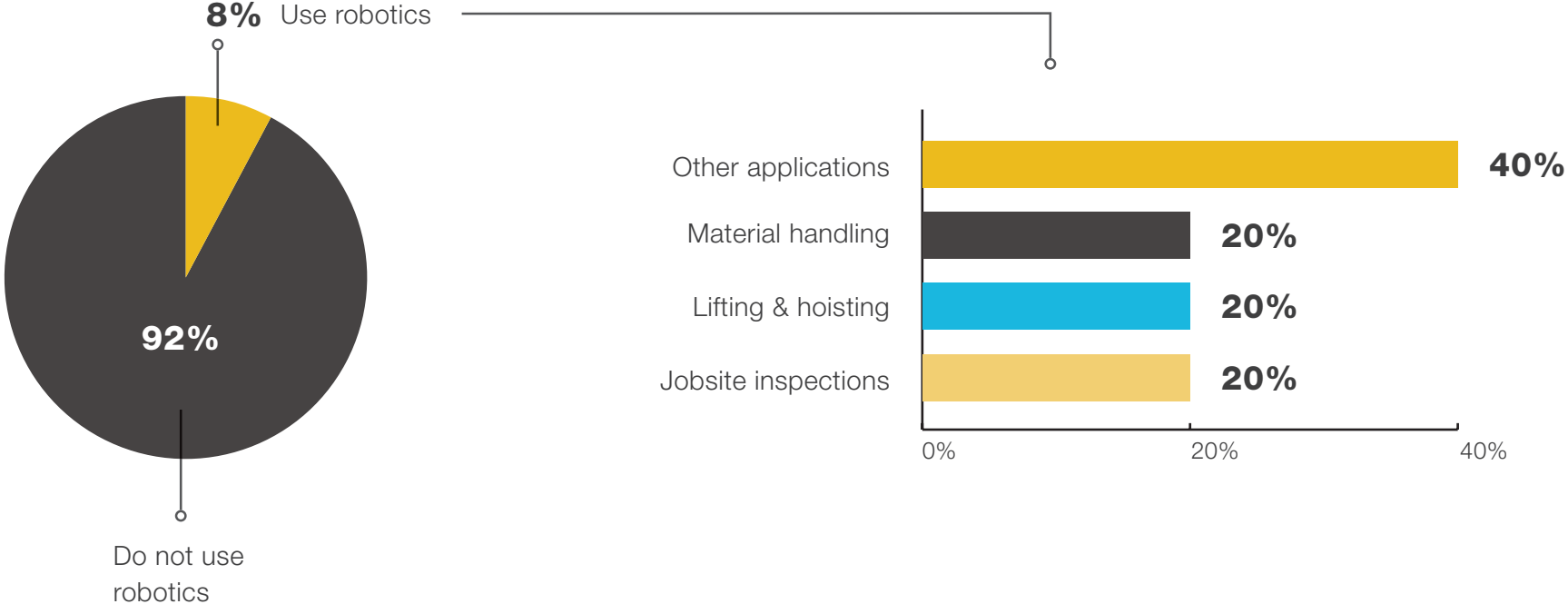
- More than 15 percent of those surveyed indicated "other" applications, including:

"Record lecture, observe clinical skill exams."
"Tech video."
"Traffic trucks (for) setting and retrieving cones."

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY
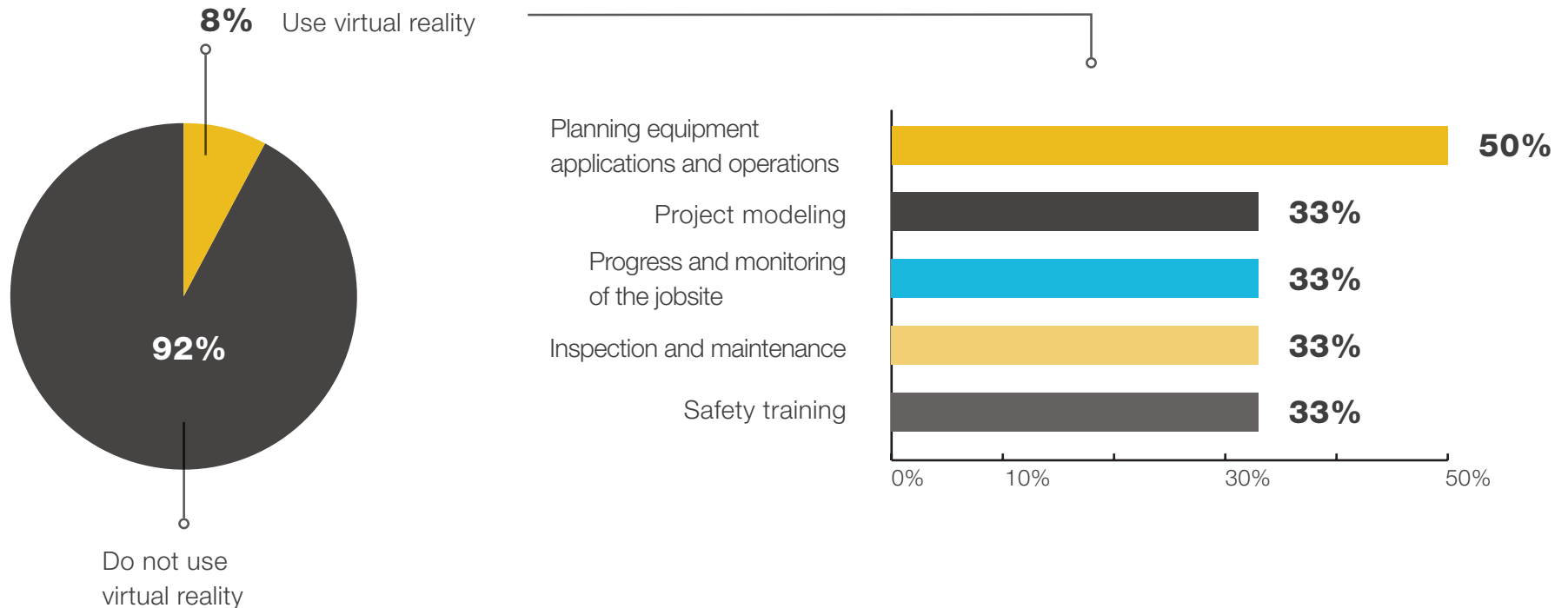
Use of robotics

8% Use robotics

92%

Do not use robotics

Other applications	**40%**
Material handling	**20%**
Lifting & hoisting	**20%**
Jobsite inspections	**20%**

0%   20%   40%

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of virtual reality

8% Use virtual reality

92%

Do not use
virtual reality

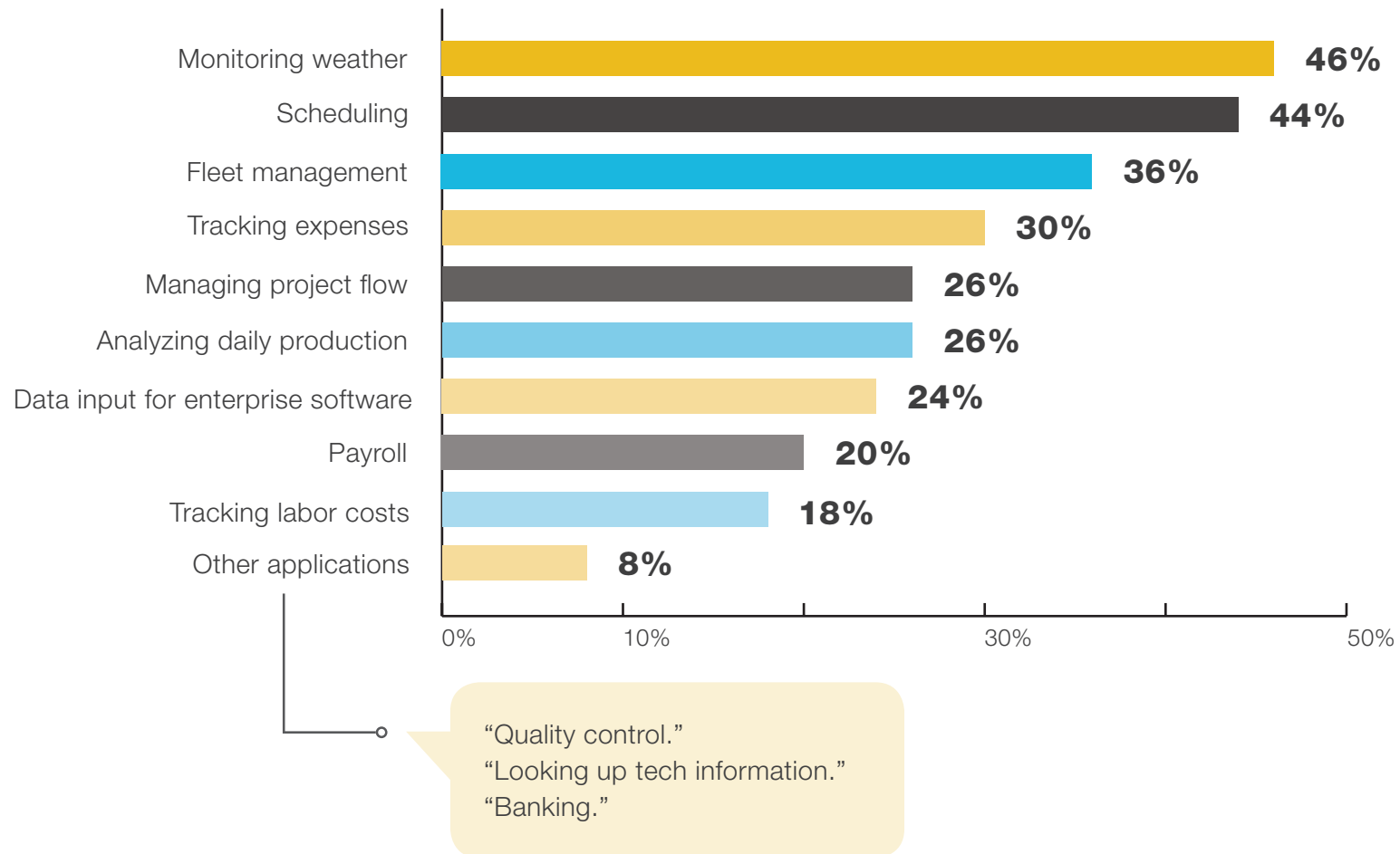|	
Planning equipment applications and operations	**50%**
Project modeling	**33%**
Progress and monitoring of the jobsite	**33%**
Inspection and maintenance	**33%**
Safety training	**33%**

0%　　10%　　　　30%　　　　50%

Use of augmented reality

- 100 percent of responders said that they do not use augmented reality.

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of mobile apps as a management tool

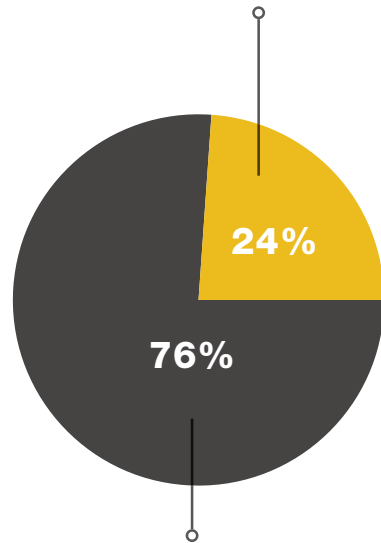- Nearly 63 percent of respondents say they use mobile apps as a management tool.

Category	Percentage
Monitoring weather	46%
Scheduling	44%
Fleet management	36%
Tracking expenses	30%
Managing project flow	26%
Analyzing daily production	26%
Data input for enterprise software	24%
Payroll	20%
Tracking labor costs	18%
Other applications	8%

"Quality control."
"Looking up tech information."
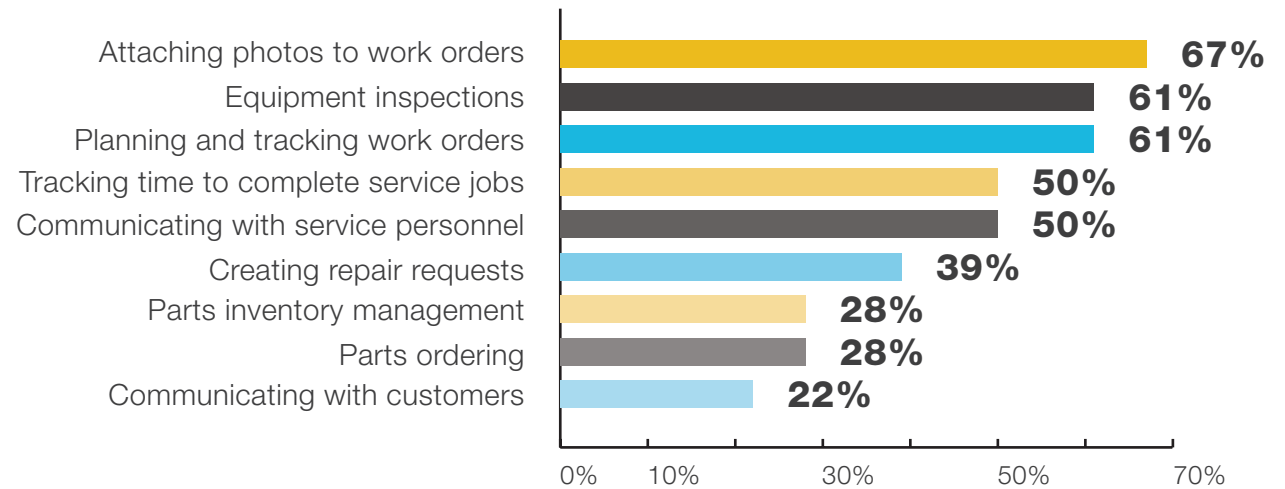"Banking."

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of mobile apps for in-house or in-field equipment maintenance

Use mobile apps for in-house or in-field equipment maintenance

24%

76%

Do not use mobile apps for in-house or in-field equipment maintenance

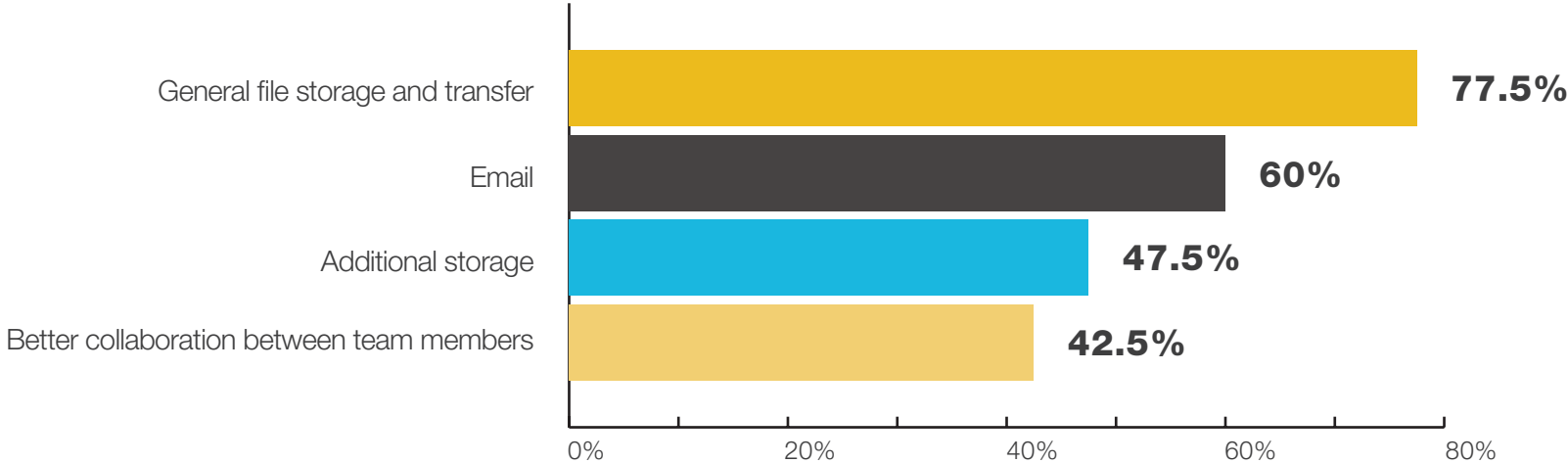|	
Attaching photos to work orders	67%
Equipment inspections	61%
Planning and tracking work orders	61%
Tracking time to complete service jobs	50%
Communicating with service personnel	50%
Creating repair requests	39%
Parts inventory management	28%
Parts ordering	28%
Communicating with customers	22%

0%   10%   30%   50%   70%

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of cloud storage

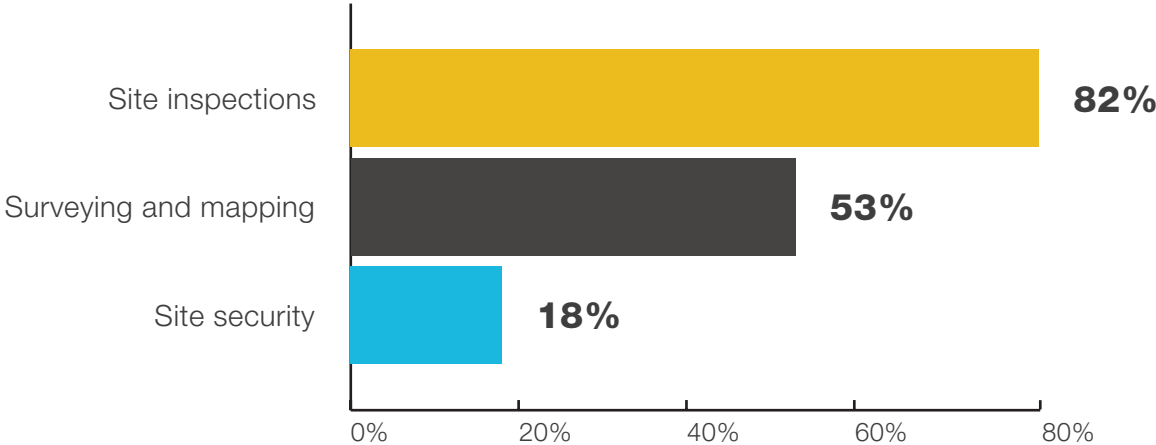• Over half of the responders (52%) said that they do use cloud storage.

Category	Percentage
General file storage and transfer	77.5%
Email	60%
Additional storage	47.5%
Better collaboration between team members	42.5%

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of UAVs

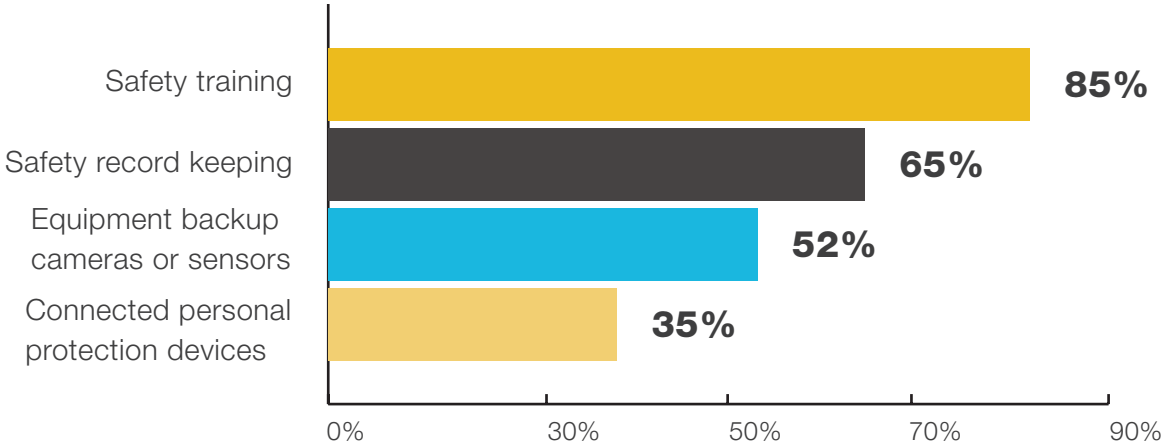- Nearly 22 percent of responders say they use UAVs.

SUMMARY OF THE FINDINGS

ORGANIZATIONAL USE OF EMERGING TECHNOLOGY

Use of safety tools

- A vast majority of responders, 85 percent, say they use safety tools

Safety training	85%
Safety record keeping	65%
Equipment backup cameras or sensors	52%
Connected personal protection devices	35%

0% 30% 50% 70% 90%

SUMMARY OF THE FINDINGS
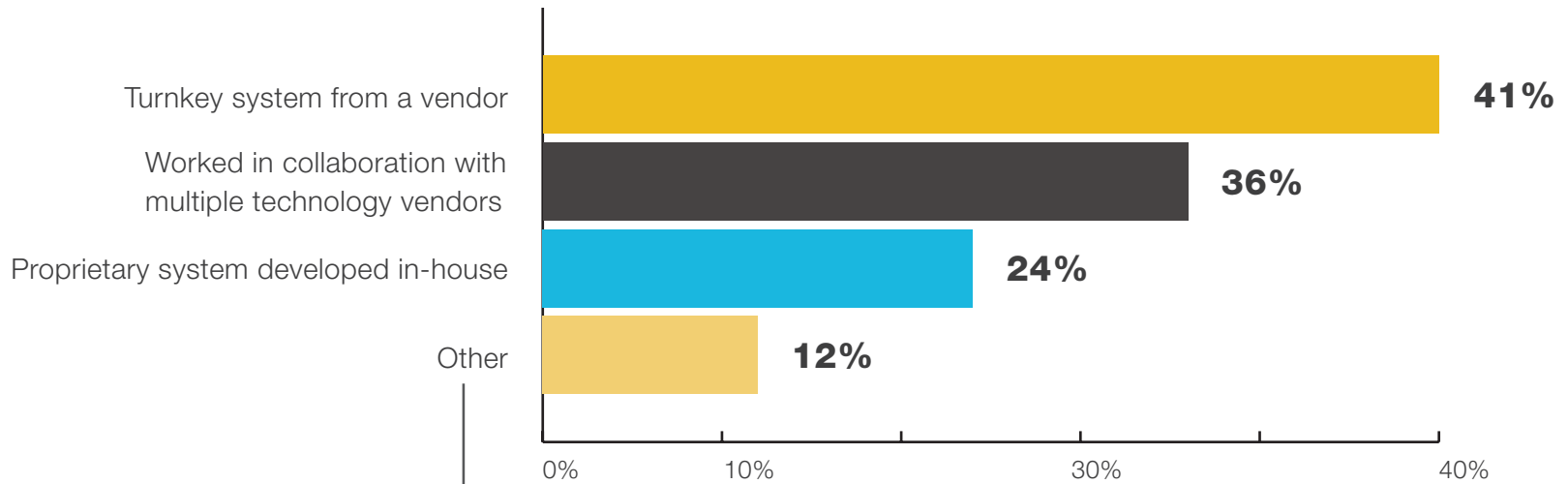
SITE/PROJECT MANAGEMENT

On the topic of site connectivity, users were asked, "if their company has implemented technology to facilitate data communications in site/project management?"

- Just over 45 percent of the responders said that their company has implemented technology to facilitate data communications in site/project management.

SUMMARY OF THE FINDINGS

SITE/PROJECT MANAGEMENT

Those surveyed were asked, "How did you implement your site-management system?"

Turnkey system from a vendor — **41%**

Worked in collaboration with multiple technology vendors — **36%**

Proprietary system developed in-house — **24%**
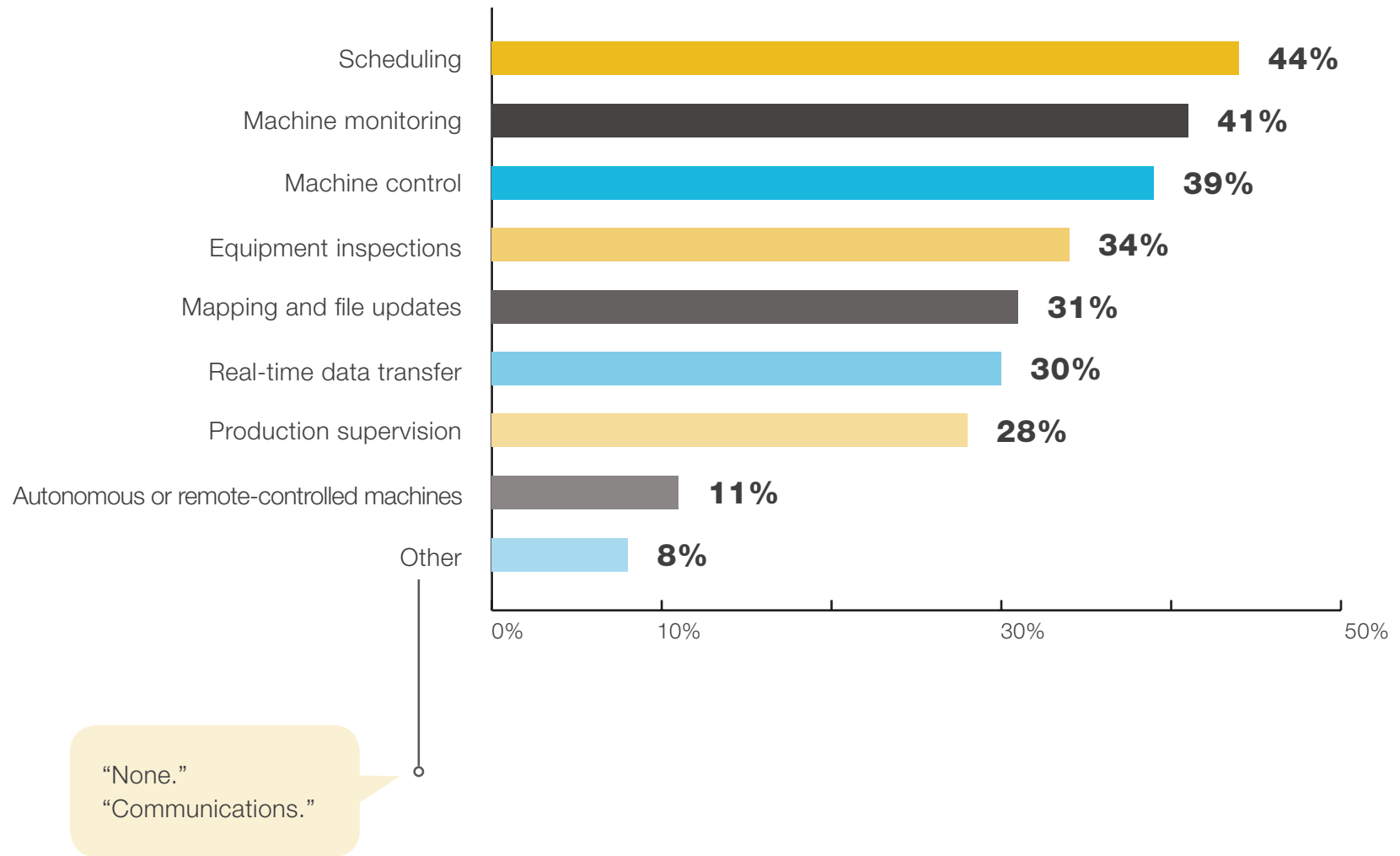
Other — **12%**

0%   10%   30%   40%

"None."
"Standard software & apps."
"Paper/pencil."
"Equipment dealer."

SUMMARY OF THE FINDINGS

SITE/PROJECT MANAGEMENT

Users were asked, "What does your site-management system include?"

Category	Percentage
Scheduling	44%
Machine monitoring	41%
Machine control	39%
Equipment inspections	34%
Mapping and file updates	31%
Real-time data transfer	30%
Production supervision	28%
Autonomous or remote-controlled machines	11%
Other	8%

"None."
"Communications."
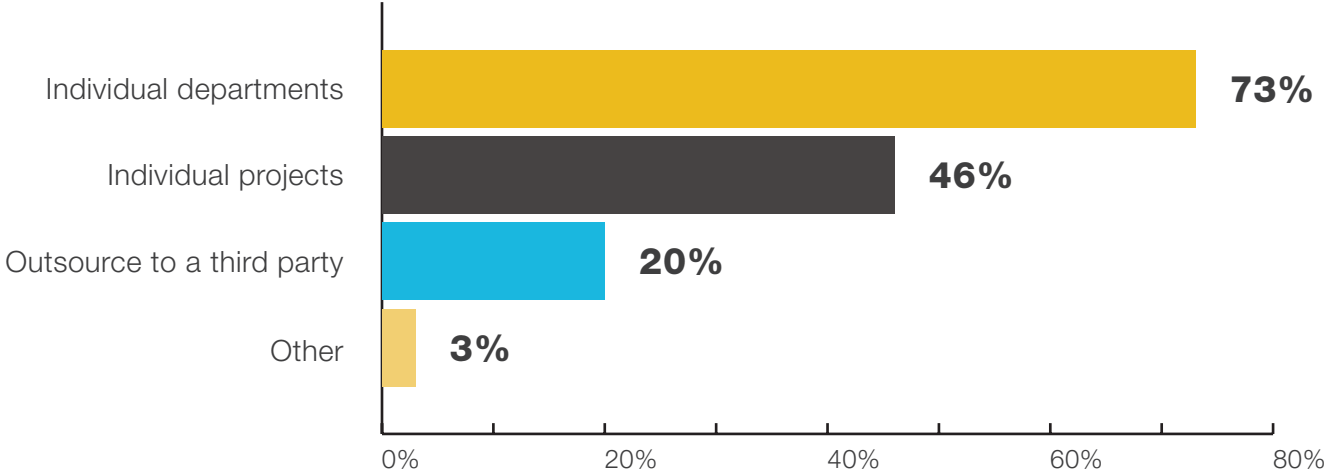
SUMMARY OF THE FINDINGS

ORGANIZATIONAL TECHNOLOGY OVERSIGHT

When it comes to corporate management, responders were asked, "Who is responsible for technology strategy and implementation?"

Category	Percentage
Company owner	49%
Corporate-level technology manager, eg, CIO or CTO	36%
Corporate-level technology committee	19%
President or Chief Executive Officer	16%
Chief Operating Officer	12%
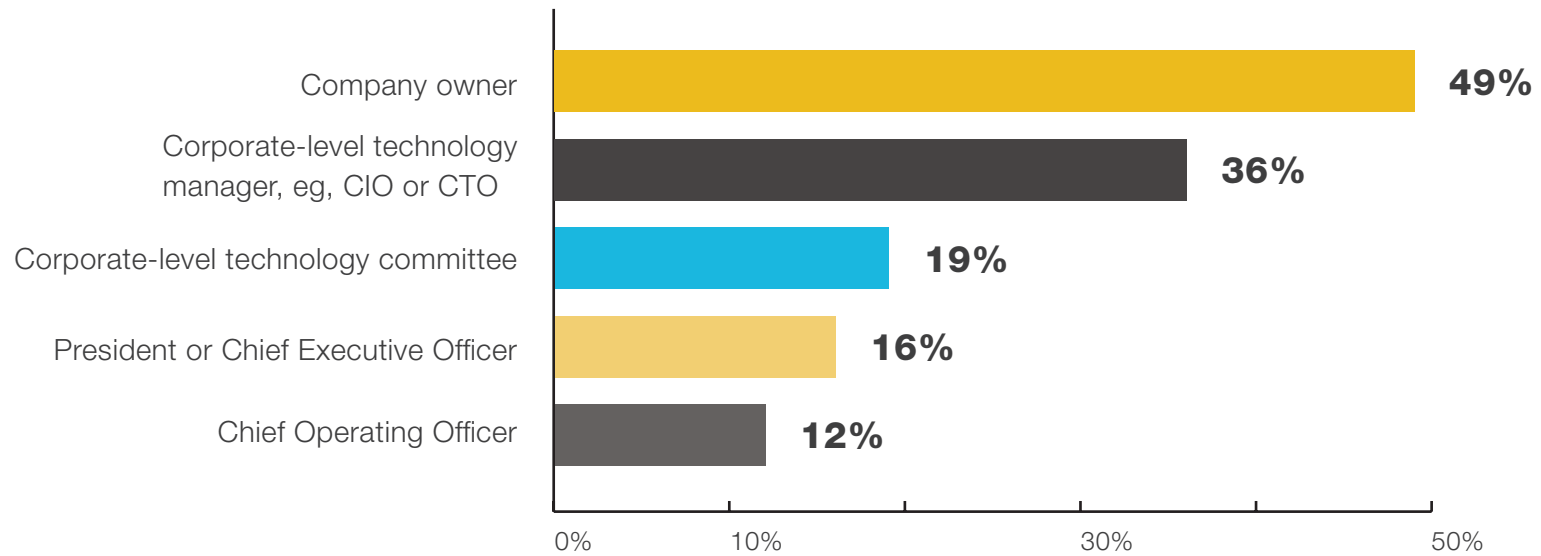
SUMMARY OF THE FINDINGS

ORGANIZATIONAL TECHNOLOGY OVERSIGHT

Who is involved?

Individual departments — 73%
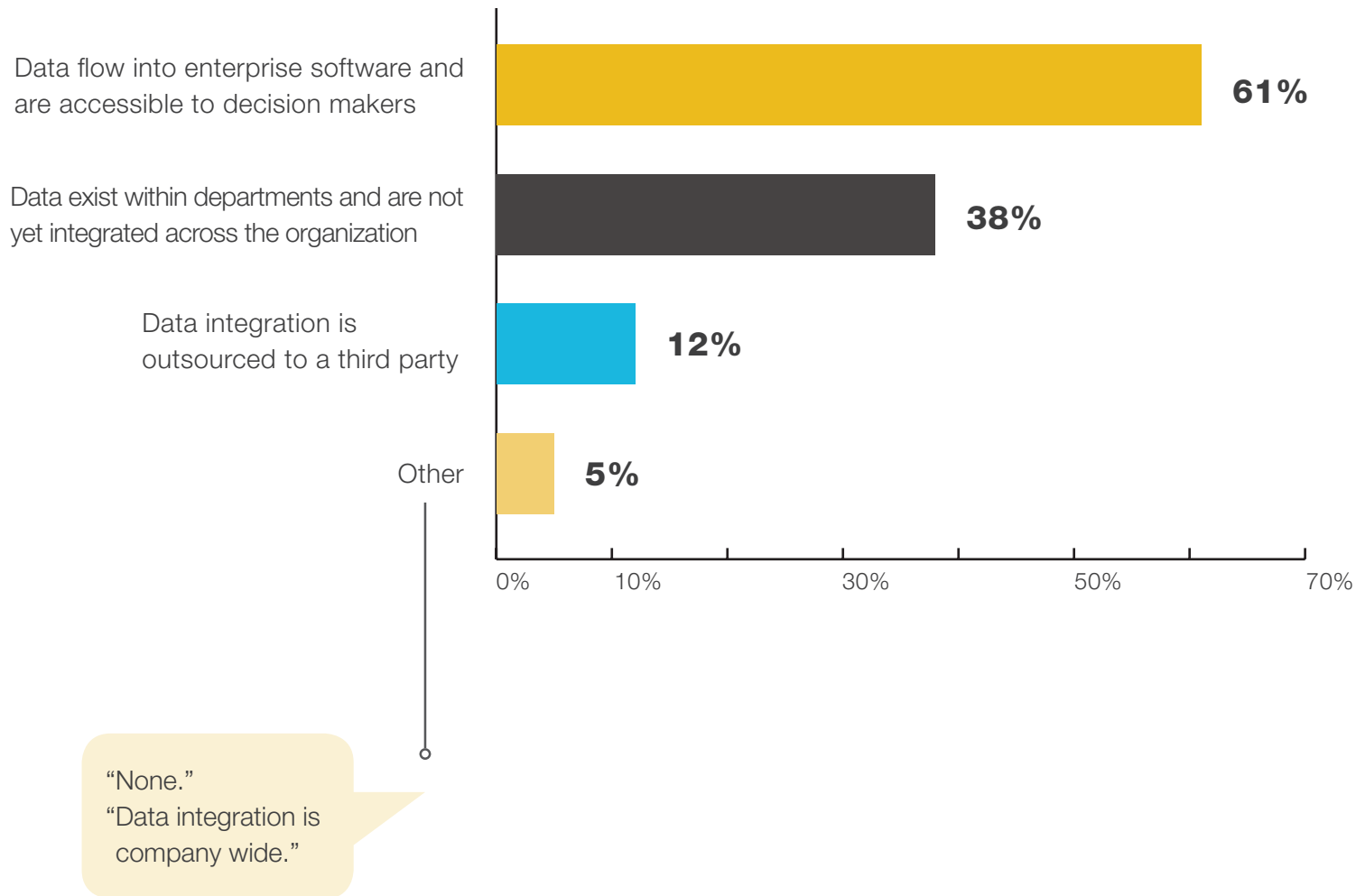Individual projects — 46%
Outsource to a third party — 20%
Other — 3%

SUMMARY OF THE FINDINGS

ORGANIZATIONAL TECHNOLOGY OVERSIGHT

Users were asked how they integrate data technology into the organization

Data flow into enterprise software and are accessible to decision makers — **61%**

Data exist within departments and are not yet integrated across the organization — **38%**

Data integration is outsourced to a third party — **12%**

Other — **5%**

0%   10%   30%   50%   70%

"None."
"Data integration is company wide."

SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Those surveyed were asked to best describe their title

Fleet & Shop Superintendents,
Engineers and other equipment staff

8%

20%

Supervisory/operating staff

Management

71%
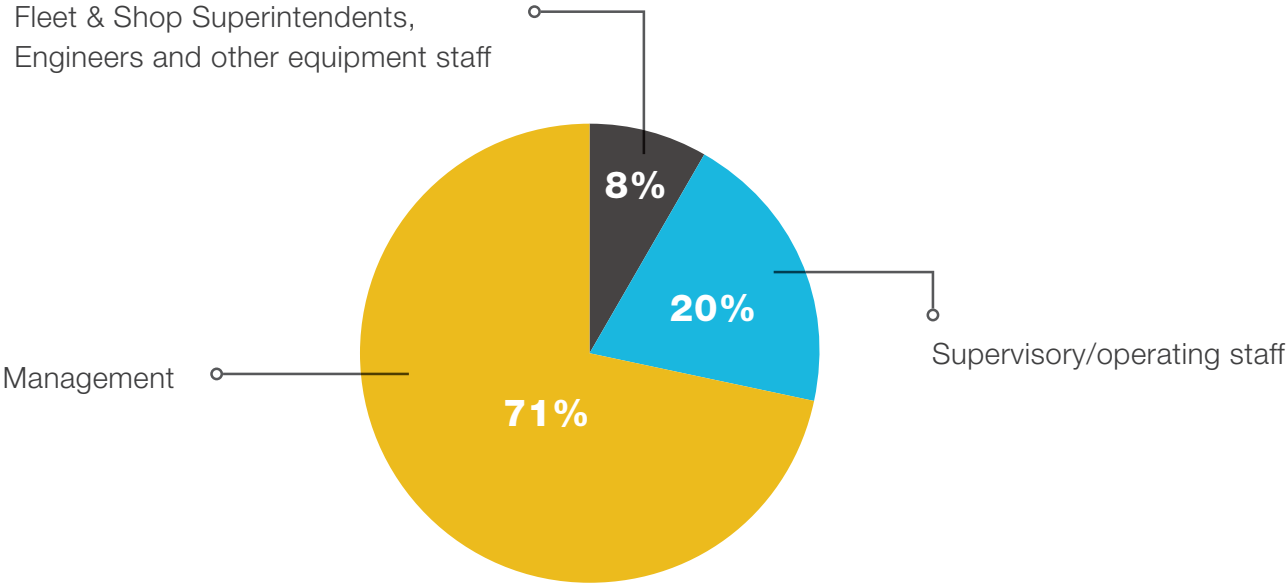
SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Equipment users were asked, "Which of the following best describes your organization?"

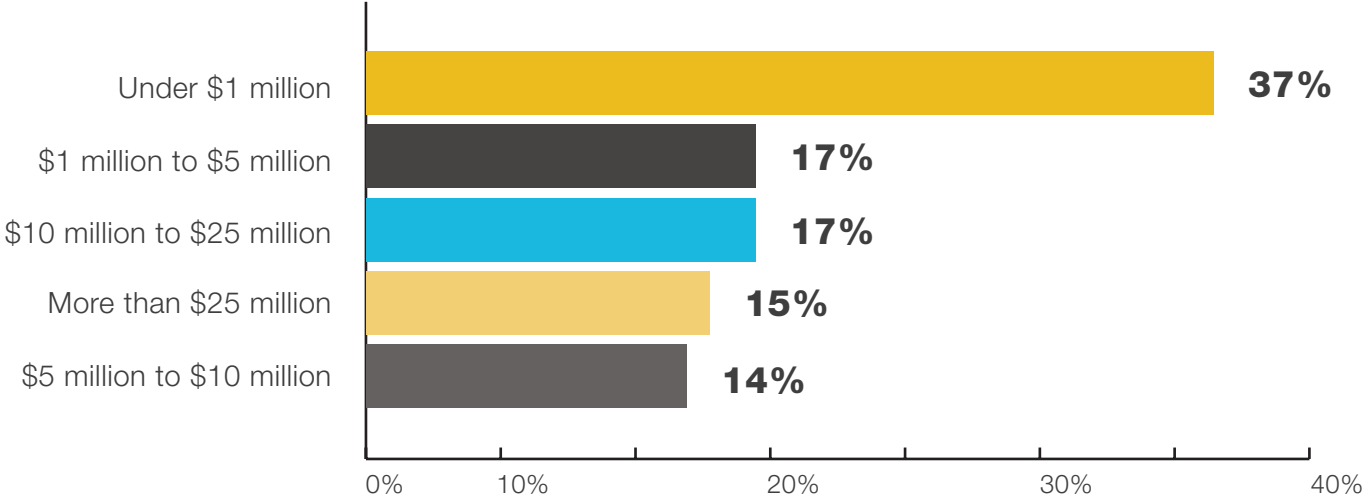| Organization	Percentage
Highway and heavy construction	23%
General building contractors	20%
Government agencies	12%
Dealer/distribution/rental outlet	9%
Water & Wastewater systems/plants	9%
Highway/heavy & general building	7%
Residential building construction	5%
Other	13%

Other:
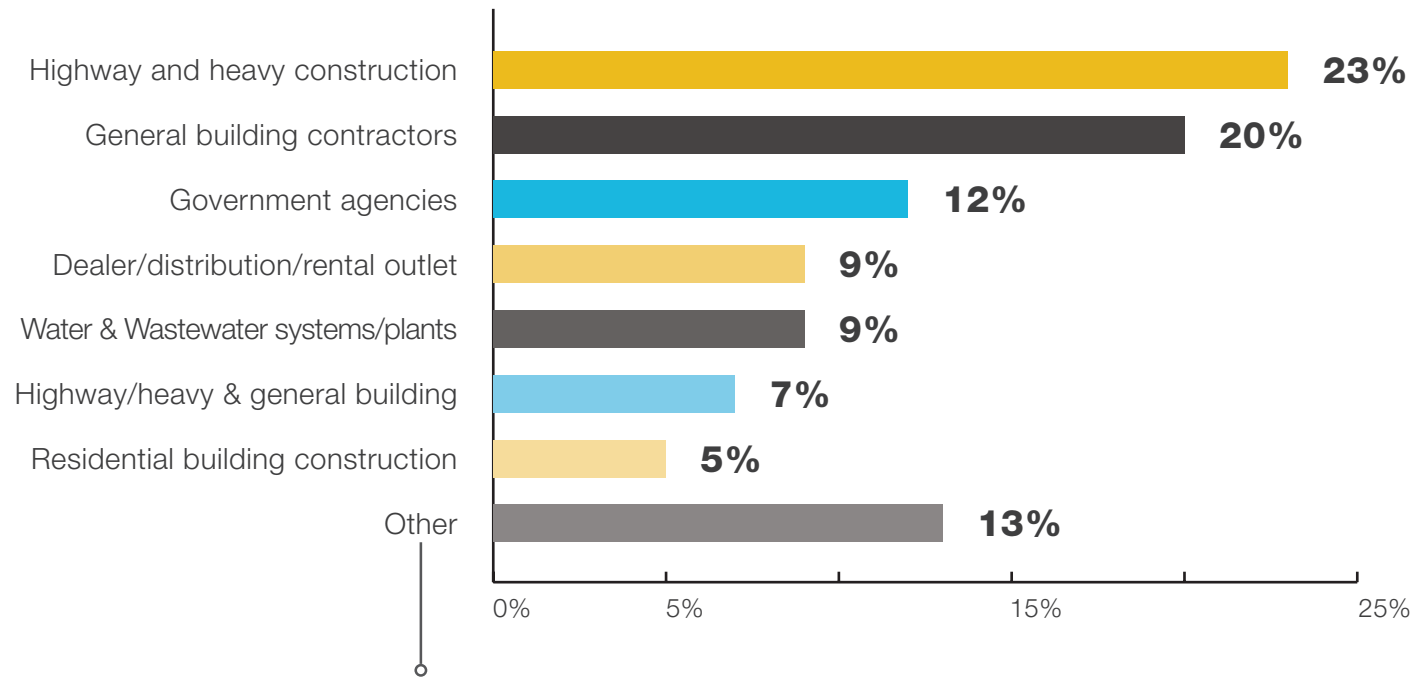
"Geotechnical Engineering."
"Water treatment sales and service."
"Mining."
"Driveway and parking lot maintenance."
"Painting contractor."
"Environmental cleanup contractor."
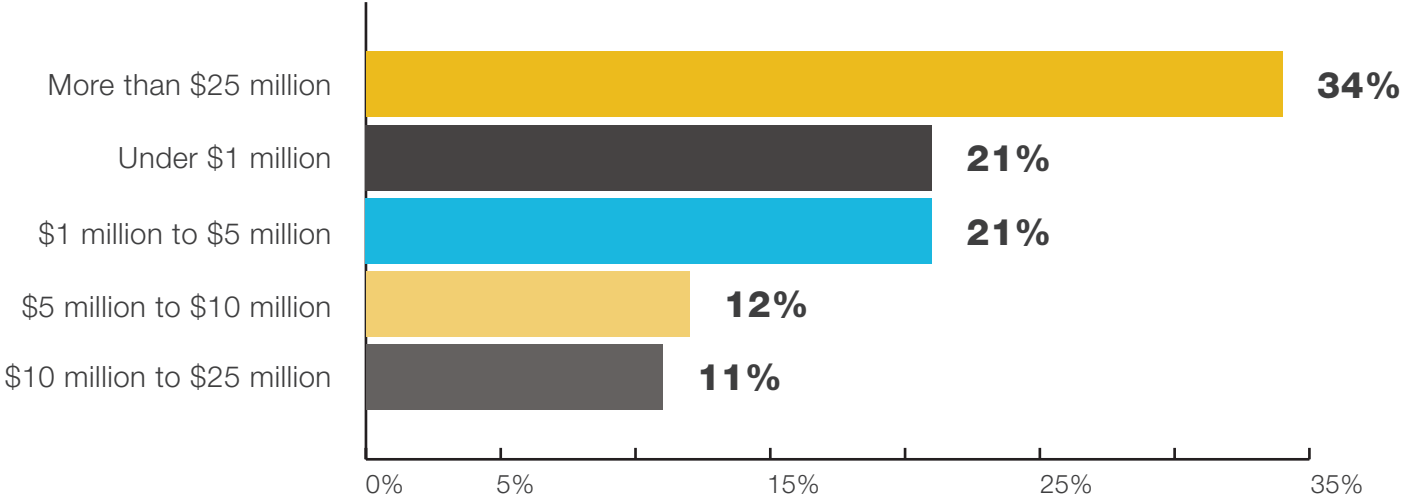
SUMMARY OF THE FINDINGS

DEMOGRAPHICS

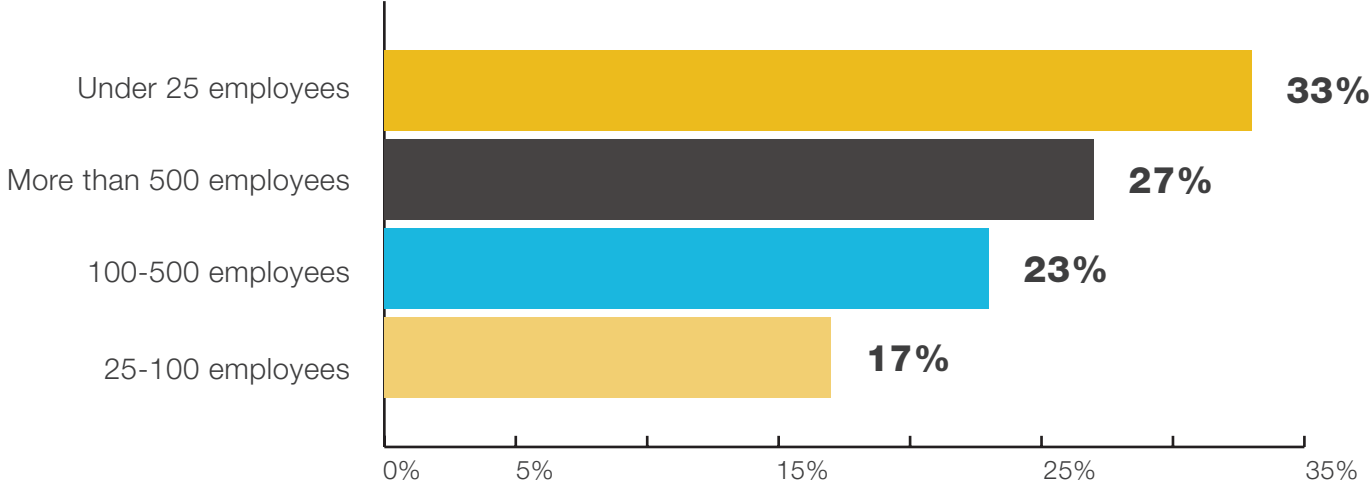*Users were asked, "Construction Equipment & Trucks owned/leased company wide"*

Category	Percentage
Under $1 million	37%
$1 million to $5 million	17%
$10 million to $25 million	17%
More than $25 million	15%
$5 million to $10 million	14%

SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Your organization's Annual Contract Volume (Non-government agencies)

Category	Percentage
More than $25 million	34%
Under $1 million	21%
$1 million to $5 million	21%
$5 million to $10 million	12%
$10 million to $25 million	11%

SUMMARY OF THE FINDINGS

DEMOGRAPHICS

Those surveyed were asked the number of people their organization employs

Category	Percentage
Under 25 employees	33%
More than 500 employees	27%
100-500 employees	23%
25-100 employees	17%