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Looking to the Future



Purpose

- **Future planning** is key for any business
- We **want to assist you with your future planning**
- **The Business Advantage Group** is an international market research, data, sales development and consulting practice specializing in the CAD/CAM/CAE/PDM/PLM sectors

Methodology

- **Annual online survey** in early 2017, allowing comparison with the survey results from the past 3 years
- Survey managed from our offices in London and San Francisco, drawing respondents from our in-house data repository of over 750,000 CAD/CAM users and decision makers and other data sources
- Sample of **720 CAD users & decision makers** across a range of company sizes and industries worldwide took part

Get Involved

- **15 Topics** and their perceived **importance, actual and future usage** related to CAD were captured, enabling us to identify **key trends in the CAD sector** now and over the next five years
- **Please take a look at our top line results and let us know if you agree or disagree with our predictions. We would love to hear your thoughts**





Key Topics

15 Key CAD trends were identified for the survey this year – the same topics as researched in 2016, which allows for year on year comparisons

- A series of questions were asked about each of the 15 CAD trends to get a better understanding of Awareness, Perceived Importance, Current Usage and Future Usage

Q. Awareness

Q: Which of the following leading trends are you familiar with or have heard of?

A prompted list was shown and respondents were asked to select all response options that apply

Q. Perceived Importance

Q: Thinking about your core business functions, to what extent do you see each of these as an important trend to your company?

A rating scale of 1 to 10 used, where 1 is not at all important and 10 is extremely important to your company

Q. Current and Future Usage

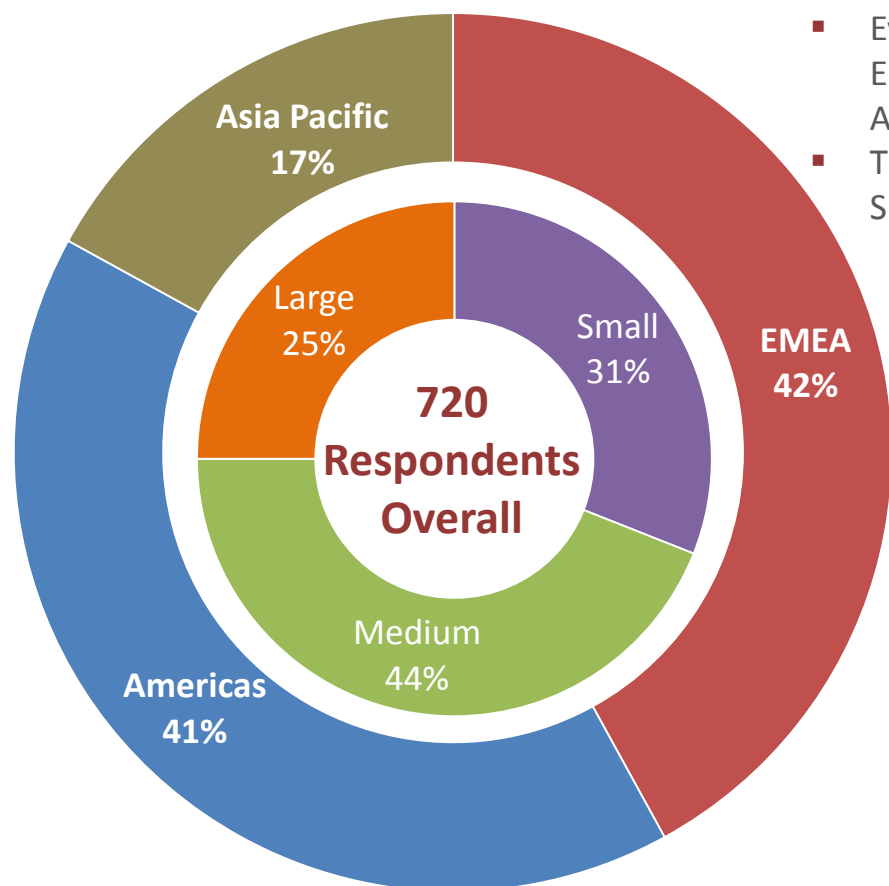
Q: Thinking about these trends again what do you/your company already use in-house at the moment? and...

...plan on using in-house within the next 12 months?

... plan on using in-house within the next 3-5 years?



The 2017 Survey Audience N=720

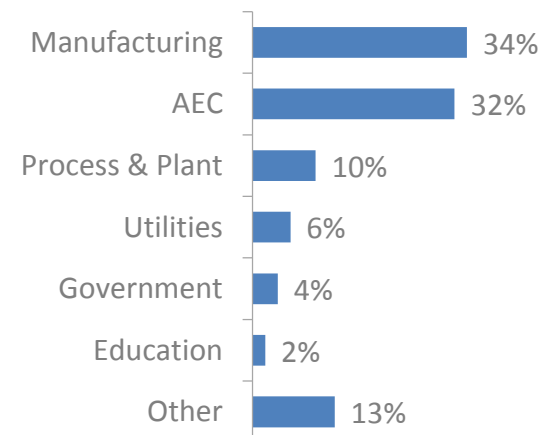
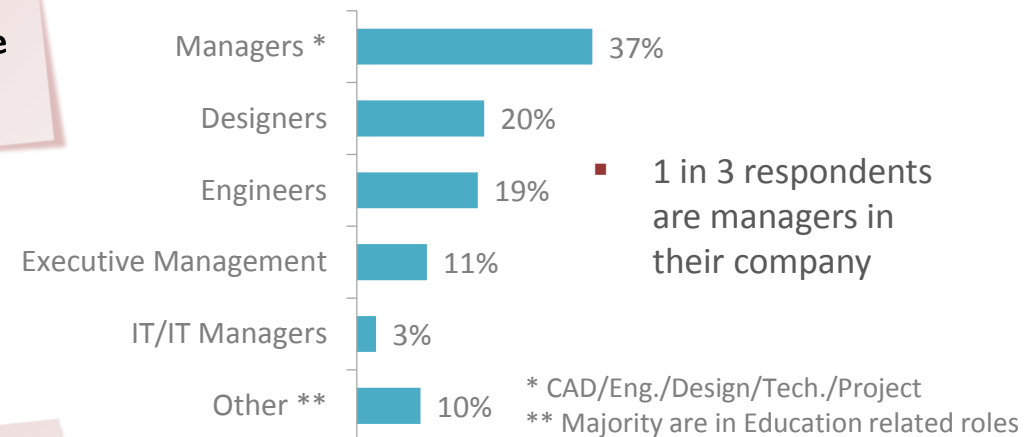


- Even split between EMEA & North America
- Three quarters are SMEs

Job Title

Sector

Respondents' Profile



1. Small (up to 50 employees)
2. Medium (51-1,000 employees)
3. Large (over 1,000 employees)



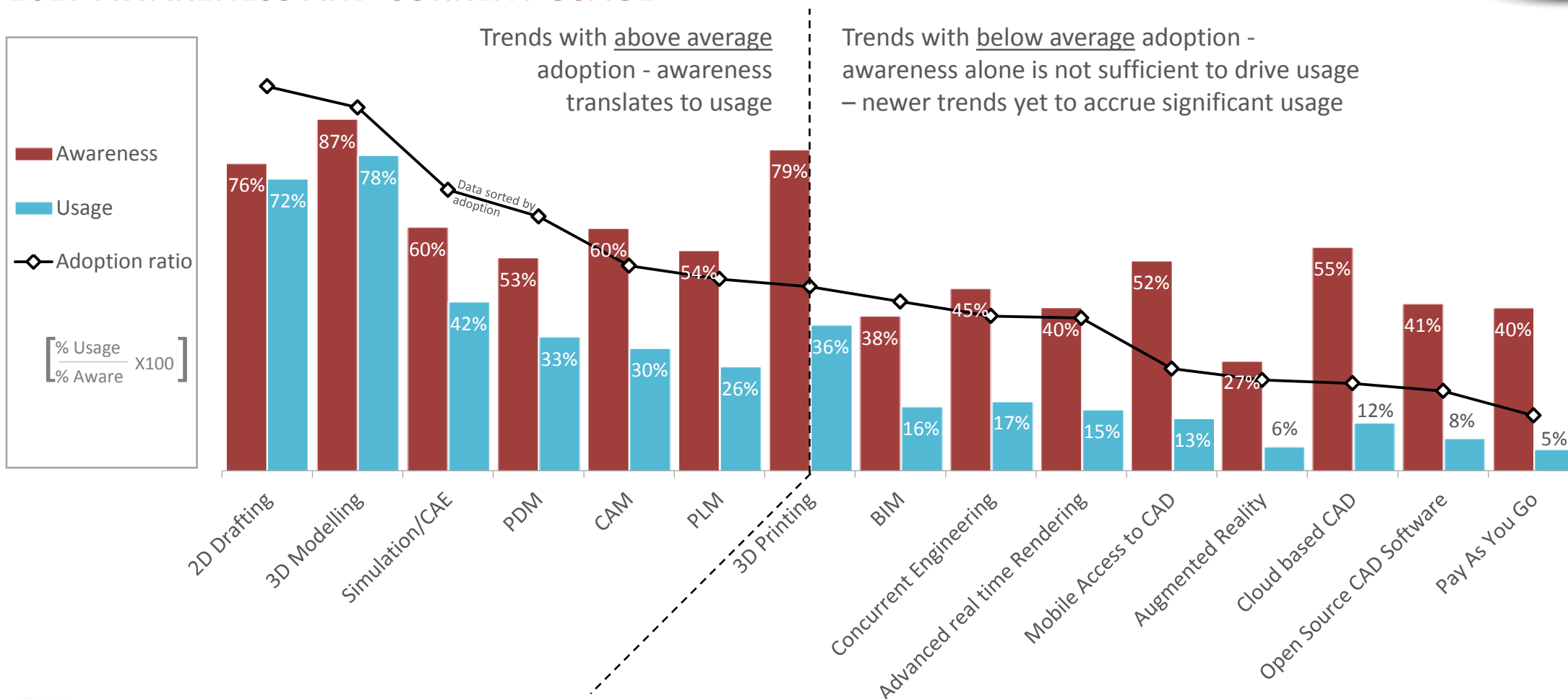
Key Trends Overview

Section One



Current Trends Snapshot: Adoption Ratio

2017 AWARENESS AND CURRENT USAGE

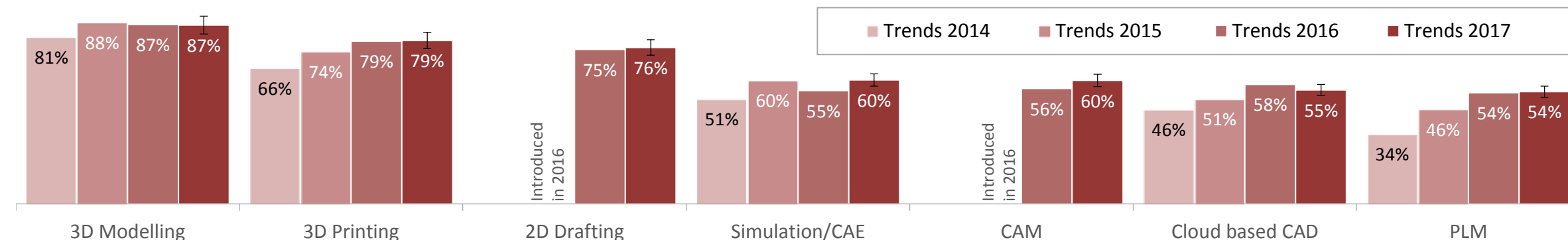




Changes in Awareness Over Time

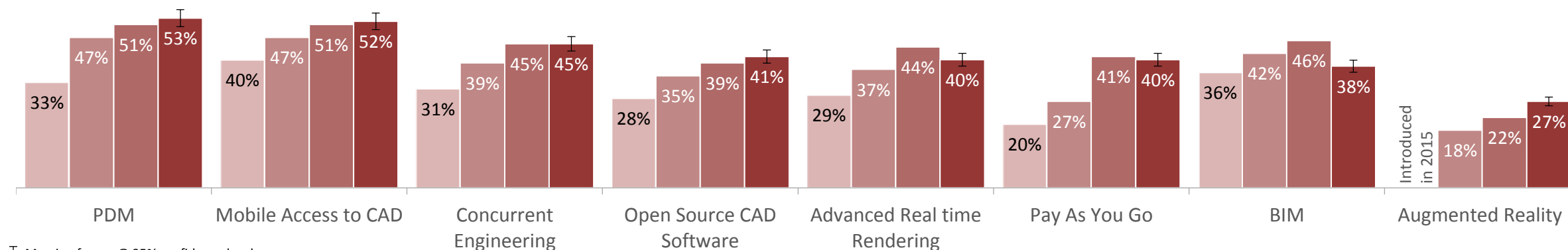
Note: Data sorted in descending order by Awareness in 2017

TOP 7 Trends



Margin of error @ 95% confidence level

Other Trends



Margin of error @ 95% confidence level

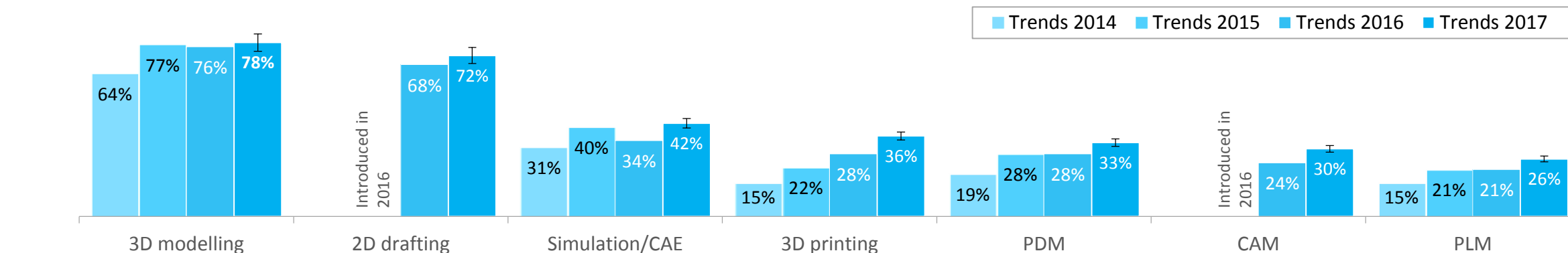




Changes in Usage Over Time

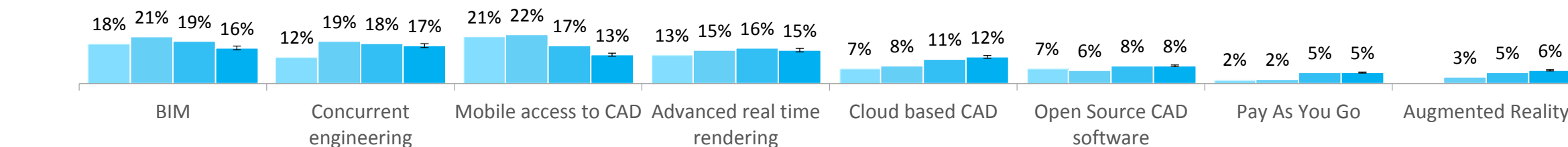
Note: Data sorted in descending order by Usage in 2017

TOP 7 Trends



Margin of error @ 95% confidence level

Other Trends



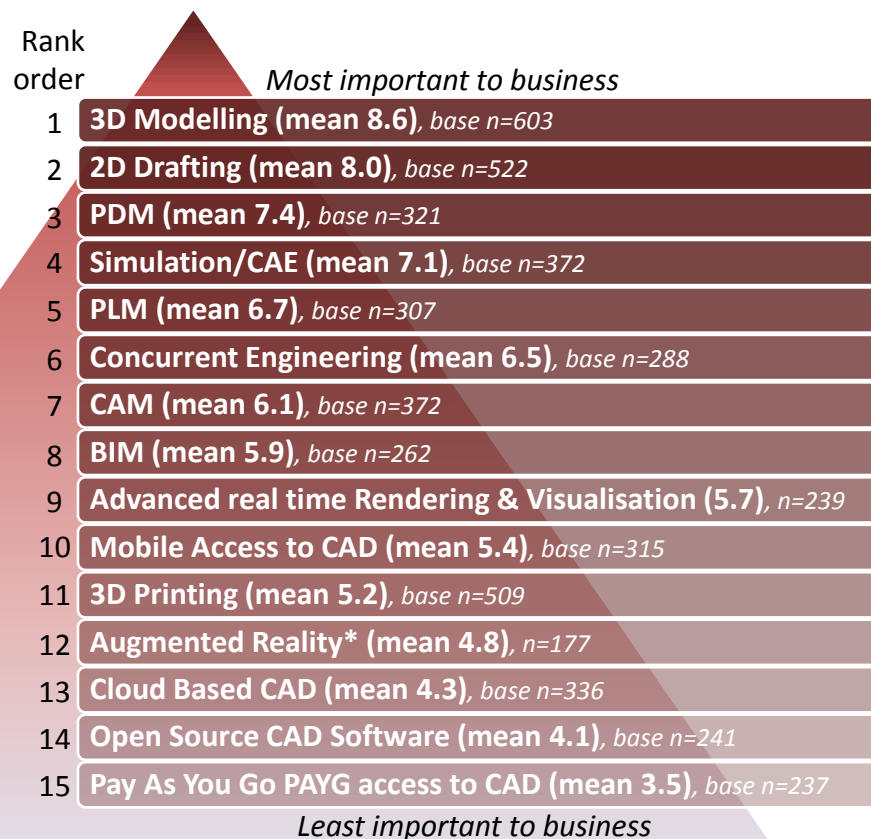
Margin of error @ 95% confidence level





Current Trends – Importance Snapshot

CAD TRENDS IMPORTANCE RANKING 2017



Note: * Use of non-geometrical data to augment a CAD model view with direct or indirect physical, real-world environment. This implies a technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view

Some CAD trends are more important to particular sectors, regions and company types...

- 3D Modelling in Manufacturing and Large companies
- 2D Drafting in APAC and Small companies
- PDM in Large companies, Americas and Manufacturing
- Simulation in Large companies, Manufacturing and other sectors
- PLM in APAC, Manufacturing and Large companies
- Concurrent Engineering in Large companies
- CAM in Large companies, and Manufacturing
- BIM in APAC, AEC, Medium to Large companies
- Advanced real-time rendering and visualisation in Americas and Large companies
- Mobile access to CAD in Large companies and AEC
- 3D Printing in Large companies, EMEA, Manufacturing and Other sectors
- Augmented Reality in Large companies, and AEC
- Cloud based CAD in AEC, and Large companies
- Open Source CAD in APAC
- PAYG access to CAD in Americas, and AEC





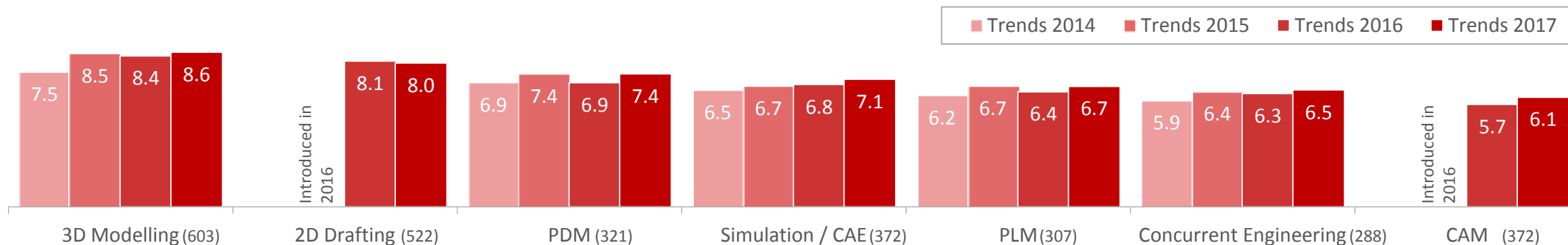
Absolute Importance Over Time

UPWARD Y-ON-Y TREND IN IMPORTANCE (MEAN SCORES) FOR MOST TRENDS

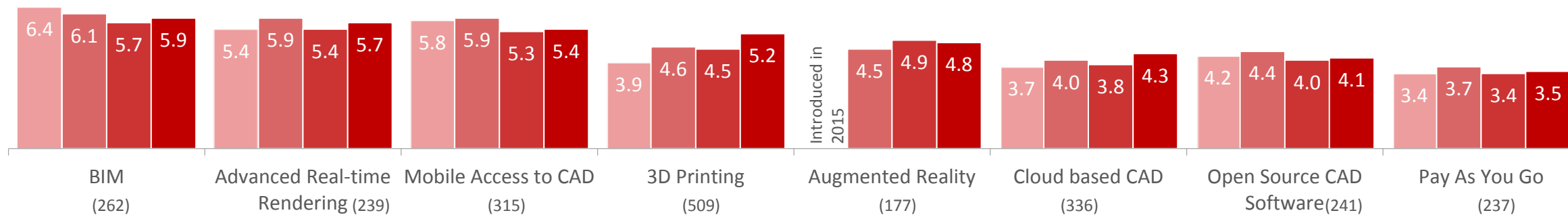
- 3D PRINTING, CLOUD BASED CAD AND PDM ARE SHOWING THE BIGGEST Y-ON-Y UPLIFT IN IMPORTANCE

TOP 7 Trends

Note: Data sorted in descending order by Absolute Importance mean scores in 2017



Other Trends

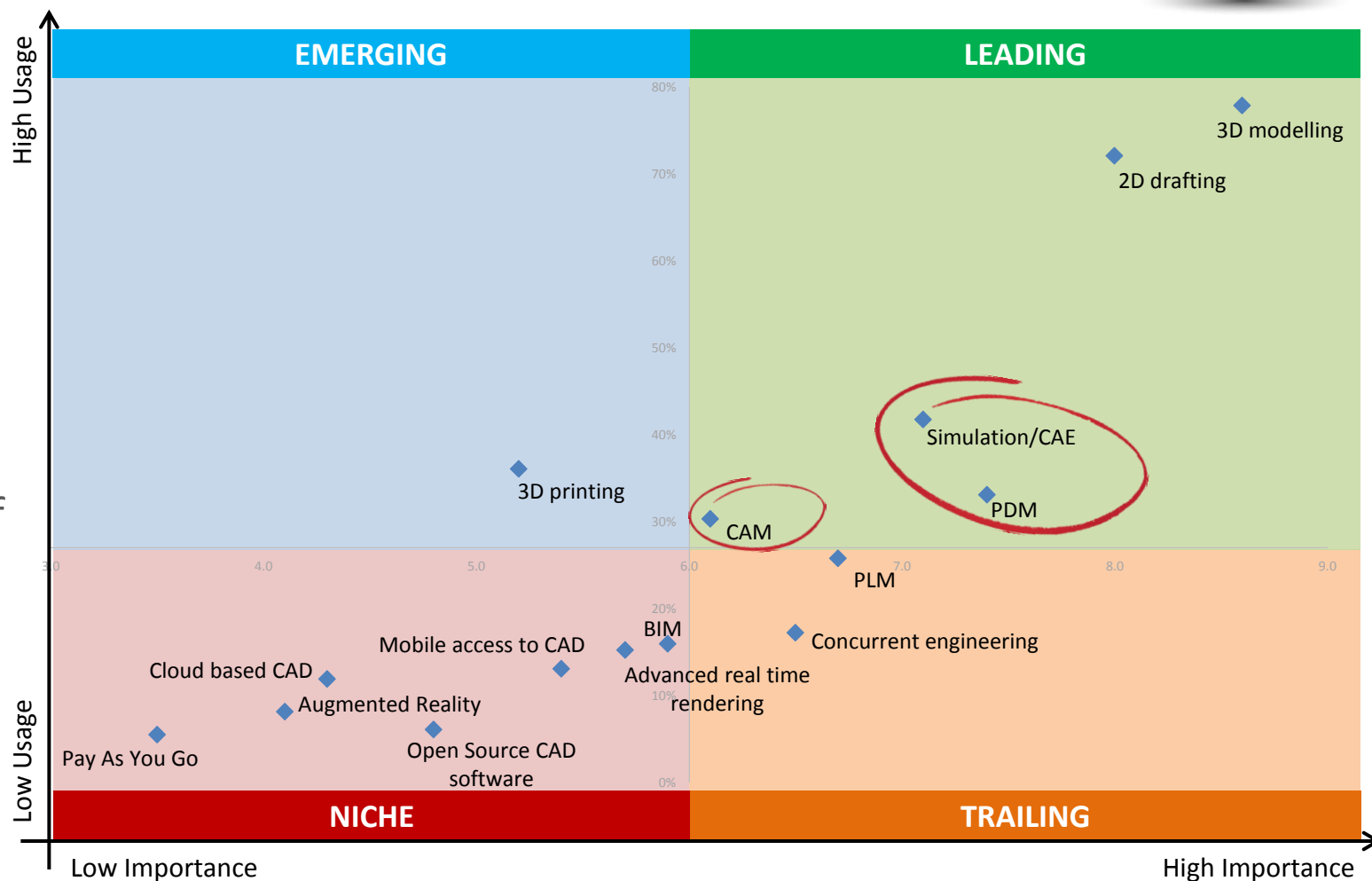




Snapshot of Usage and Importance

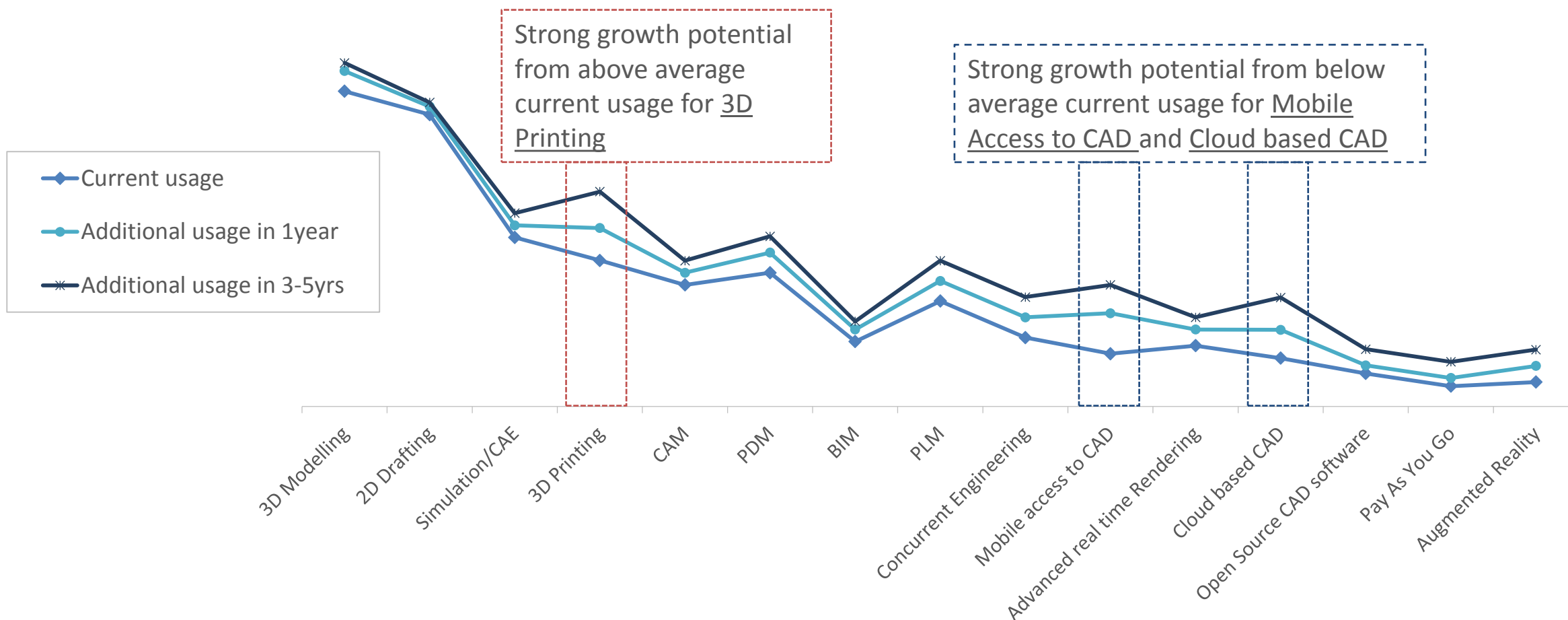
2017 USAGE AND IMPORTANCE

- This chart plots perceived importance of trends against current usage
- The market is still strongly focused on 3D modelling followed by 2D drafting
- There are however, a number of tools such as Simulation, CAM, and PDM, which have become key technologies for Design and Engineering firms



Looking to the Future

PREDICTED FUTURE USAGE





Diagnostics on Current Usage & Future Potential

2017 CAD Trends ranked by future growth potential – additional analysis in sectors with appreciable differences in current/future usage





Mapping Future Potential

- In order to identify opportunities in the CAD market, our focus turns to ranking trends by their growth potential over the next 5 years
- Trends which are currently the most important to users are reaching market saturation, as they have very high current usage and therefore relatively little scope to further expand their reach
- So although current usage and perceived importance are still relatively low for what have been termed the more “niche” trends, they are where the future growth lies
- The following slides explore these trends in order of their growth potential ratio over the next 3-5 years, whilst also highlighting where they sit in the importance rankings



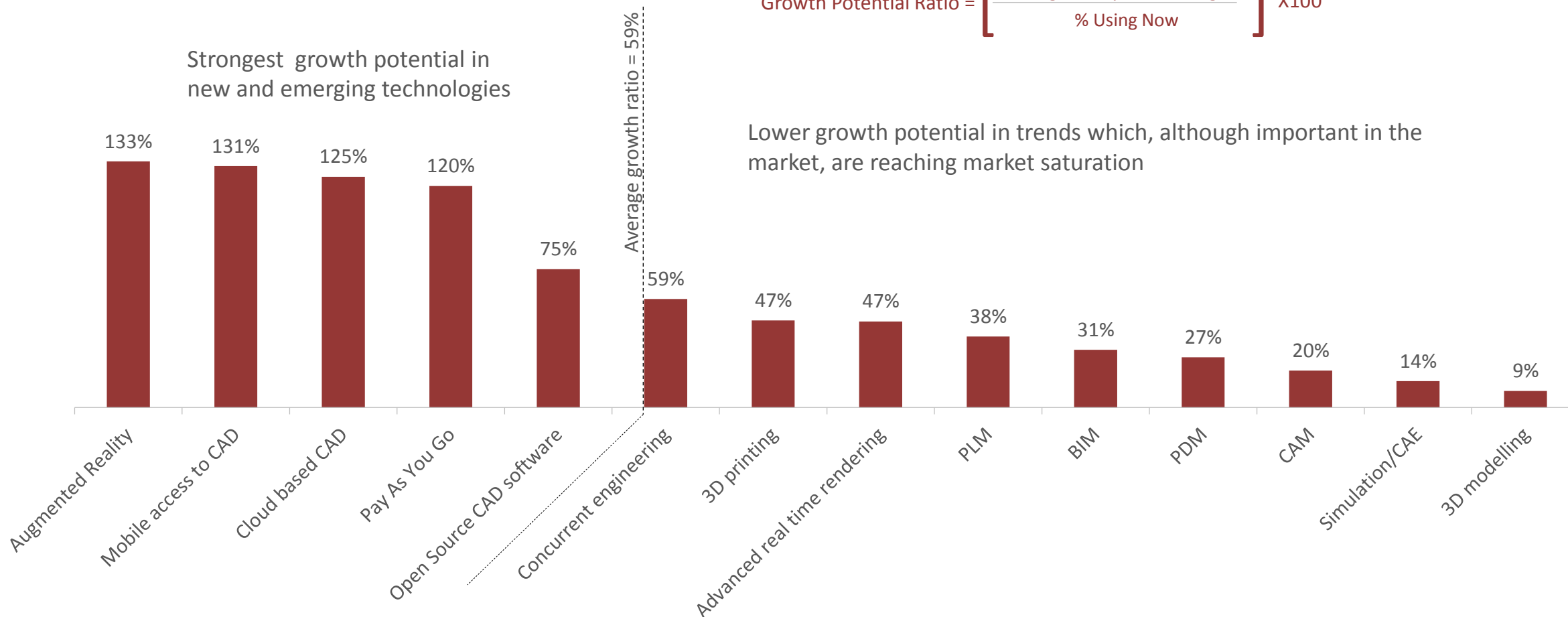
Mapping Future Potential

GROWTH POTENTIAL

$$\text{Growth Potential Ratio} = \left[\frac{\% \text{ Using in 3-5 yrs.} - \% \text{ Using now}}{\% \text{ Using Now}} \right] \times 100$$

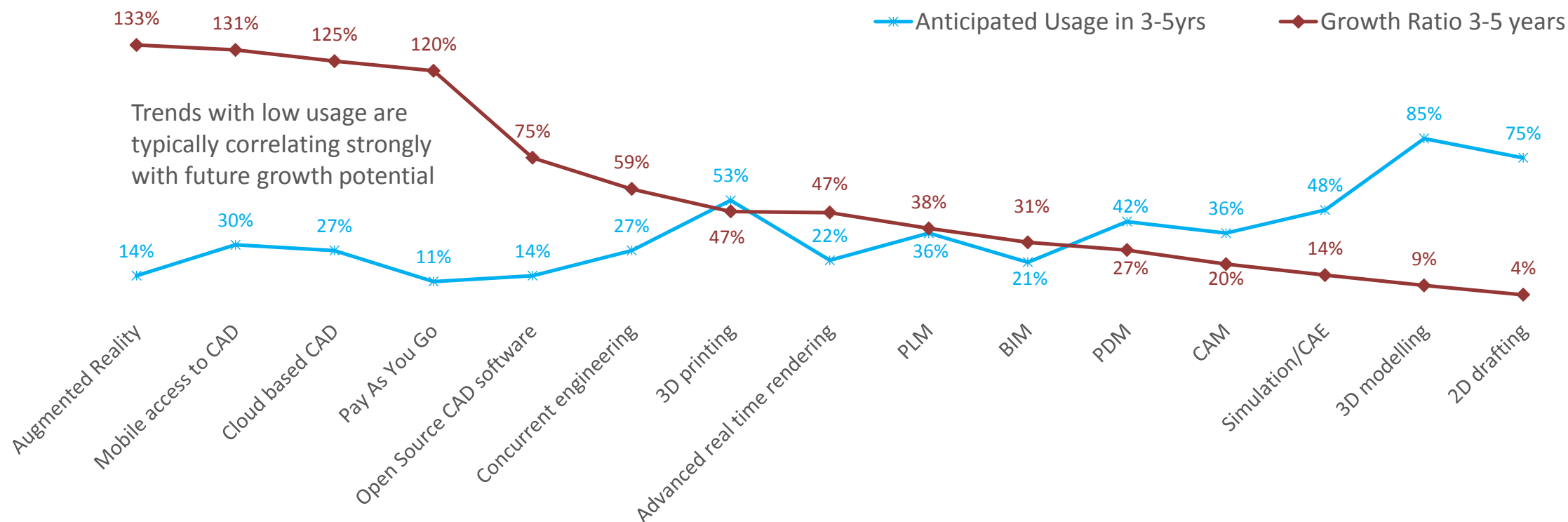
Strongest growth potential in new and emerging technologies

Lower growth potential in trends which, although important in the market, are reaching market saturation



Mapping Future Potential Growth Versus Future Usage

POTENTIAL FUTURE GROWTH POTENTIAL VERSUS POTENTIAL USAGE (IN 3-5 YEARS)

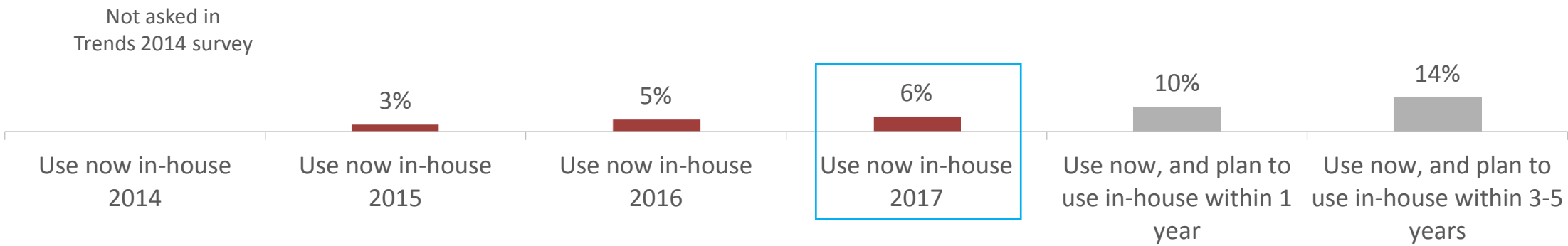




Augmented Reality

2017 IMPORTANCE MEAN SCORE 4.8
CURRENT USAGE 6%

Very low current usage & importance, but highest future potential across all trends



KEY FACTS

Observation: Augmented / Virtual Reality remains a very niche area in today’s market with relatively low importance and low usage.

Forecast: Future growth predictions are strong, but from a low base level of current usage – Around 1 in 20 are current users. EMEA, Large companies and Other sectors (not Manufacturing or AEC) are likely to be driving usage in the next 12 months. Americas, Other sectors, and Large companies are driving the potential use in 3-5years.

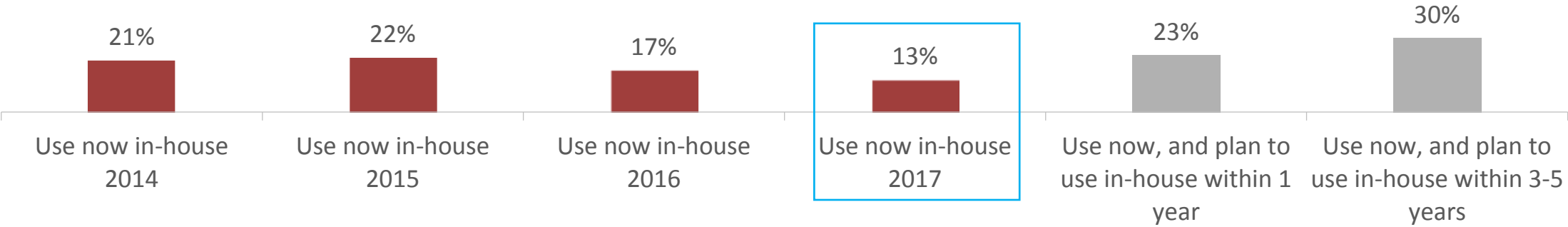
Sectors: Low usage is evident across all industry sectors and geographic regions, with higher usage in large companies .



Mobile Access to CAD

2017 IMPORTANCE MEAN SCORE 5.4
CURRENT USAGE 13%

Low current usage & importance, but good future potential



KEY FACTS

Observation: Mobile Access to CAD is an area in flux, with a continued downturn in use in 2017, and slightly below average importance against other trends, but good future potential.

Forecast: Predicted future growth is above average, despite the decline seen year on year – and this is reflected in the hardware used currently and in the future. All groups are likely to drive this potential increase in the usage in the next 12 months. Americas, and Manufacturing sector are likely to drive this predicted increase in 3-5 years.

Sectors: Current usage is significantly lower in APAC. Mobile usage continues to have more impact in the AEC sector compared to the manufacturing sector.

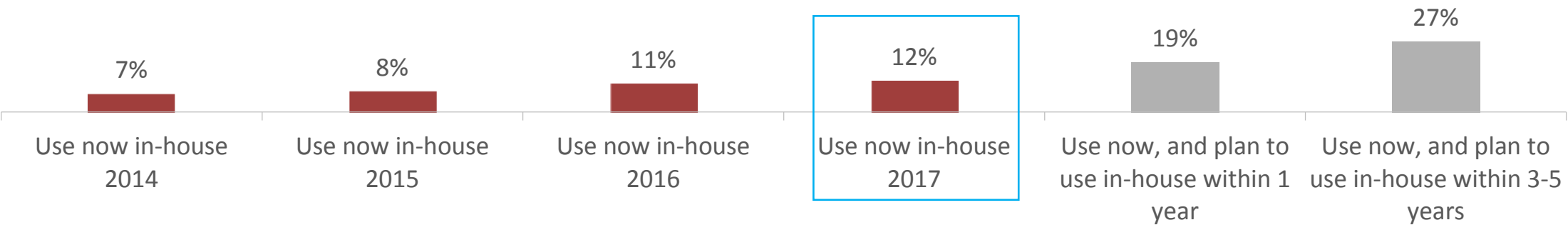




Cloud Based CAD Applications

2017 IMPORTANCE MEAN SCORE 4.3
CURRENT USAGE 12%

Low current usage & importance, but
very strong future potential



KEY FACTS

- Observation:** Cloud based CAD sees stable but low usage and importance in today’s market – although there is clearly interest as future growth potential is strong.
- Forecast:** Good future predicted growth potential, particularly in the longer term of 3-5 years, although from a relatively low base level of usage. Manufacturing sector is likely to drive this increase in the usage in the next 12 months. Americas, and Large companies are likely to drive this increase in 3-5 years.
- Sectors:** Current usage is consistently around 1 in 10. Americas, Manufacturing and other sectors and large companies are more likely to be using Cloud based CAD.
- Benefits:** The perceived benefits of cloud based CAD are higher mobility (65%), ease of updating software (36%), cost reductions (30%), increased storage capacity (29%), improved scalability (28%) and access to agile and adaptive infrastructure (22%). *(based on those using or planning to use Cloud based CAD).*

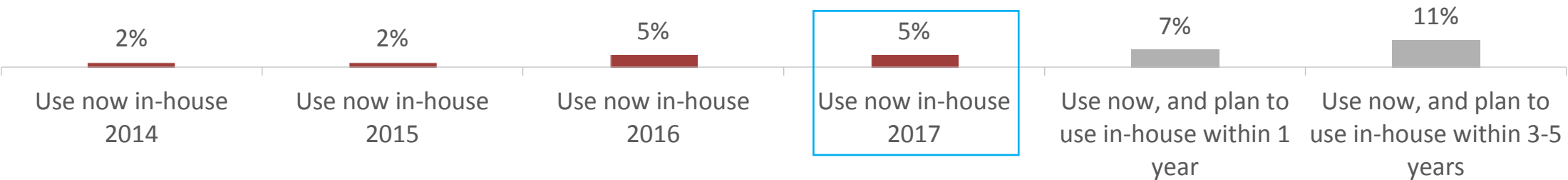




Pay As You Go (PAYG)

2017 IMPORTANCE MEAN SCORE 3.5
CURRENT USAGE 5%

Very low current usage & importance, but high future potential across trends



KEY FACTS

- Observation:** Very niche area in today’s market with low importance and very low usage, remaining stable after the uplift seen in 2016.
- Forecast:** Predicted future growth is very strong but from a low baseline. A significant uplift in usage was seen from 2015 to 2016, although this upward trend has not been maintained in 2017. All groups are equally likely to drive this modest increase in the usage in future. Americas, Manufacturing and Large companies are likely to drive this increase in the 3-5 years.
- Sectors:** PAYG is currently used more in the AEC than Manufacturing sector.

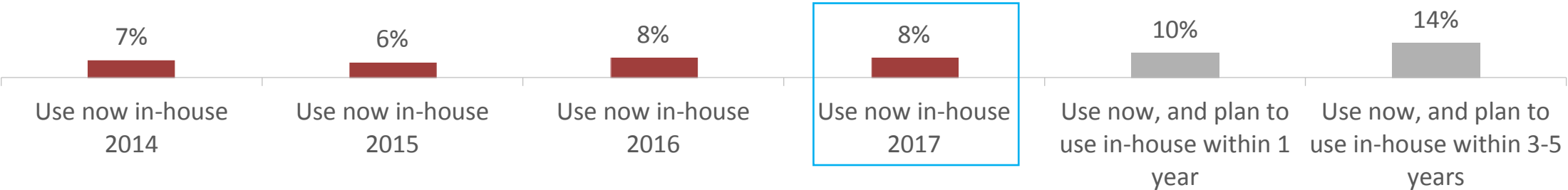




Open Source CAD Software

2017 IMPORTANCE MEAN SCORE 4.1
2017 USAGE 8%

Very low current usage & importance, but some future potential



KEY FACTS

Observation: Very niche area in today’s market, with below average importance and usage – the growth in usage seen from 2015 to 2016 is not maintained in 2017.

Forecast: Predicted future growth potential is above average, although from a low base level. Medium size companies are likely to drive this increase in the next 12 months. Americas, is likely to drive this increase in the 3-5 years.

Sectors: Low usage is evident across all industry sectors, company sizes and regions.

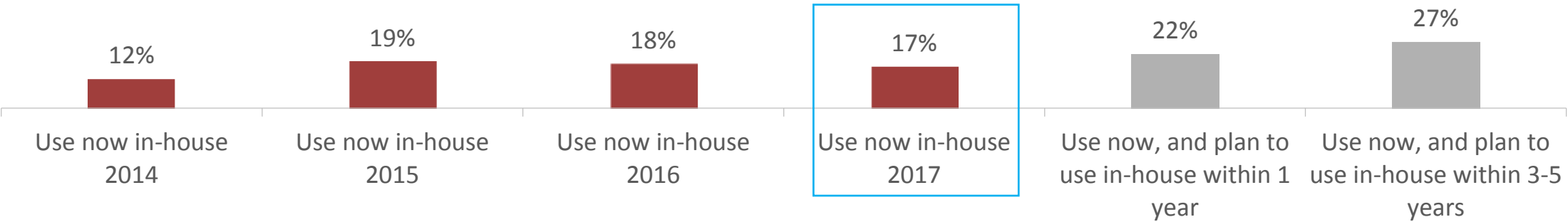




Concurrent Engineering

2017 IMPORTANCE MEAN SCORE 6.5
CURRENT USAGE 17%

Low current usage, but above average importance, and average growth potential



KEY FACTS

- Observation:** Concurrent Engineering continues to be an area of interest (trailing trend) in today’s market, with above average importance, although usage is still low.
- Forecast:** Future usage growth potential in 3-5 years is just below the average levels (across all trends) at 59%. Americas and other industry sectors (not Manufacturing or AEC) are likely to drive this increase. Increase in the usage in 3-5 years is most likely to be coming from Manufacturing and Other sectors.
- Sectors:** Current usage is above average for Americas, Manufacturing sector and especially large companies.

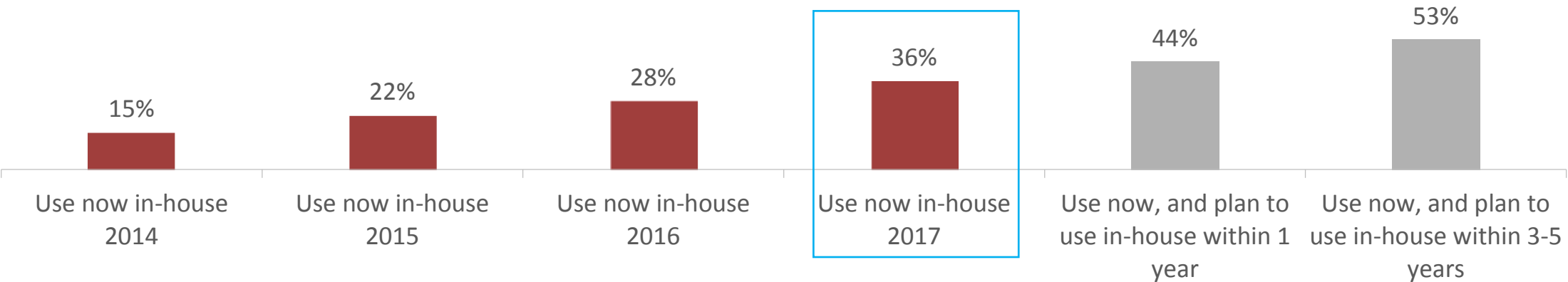




3D Printing

2017 IMPORTANCE MEAN SCORE 5.2
CURRENT USAGE 36%

Good levels of current usage, lower importance and below average future potential



KEY FACTS

- Observation:** An emerging trend with consistent increase in usage over time, but importance remains below average.
- Forecast:** Predicted future growth potential is below average across all trends.
- Sectors:** Much higher usage in EMEA, Manufacturing sector and large companies.
- Current Use:** Limited brand recognition with almost half (48%) unable to name the brand they use or plan to use. 1 in 5 (20%) use Stratasys, and 14% use 3D Systems and Makerbot. Printers are generally used for prototyping (66%) followed by R&D (63%).
- Benefits:** Benefits of 3D printing seen as design improvements (63%), savings on design time (56%) and costs (45%), and faster response time to market (43%).

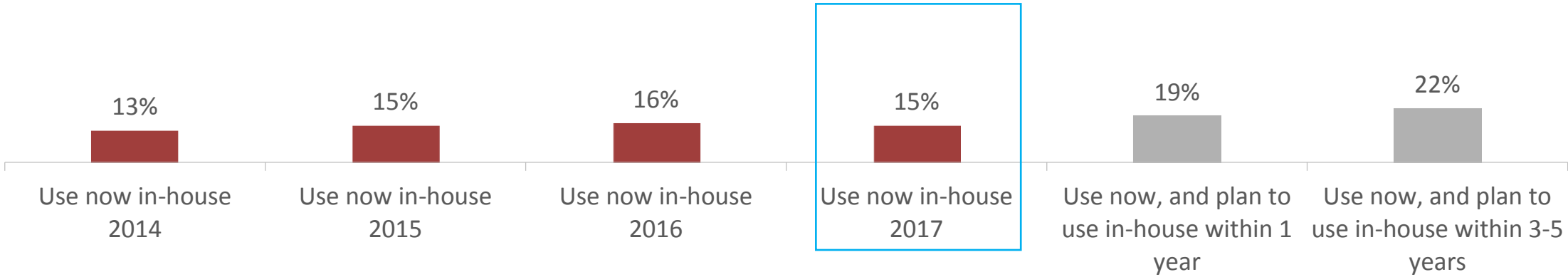




Advanced Real-Time Rendering and Visualization

2017 IMPORTANCE MEAN SCORE 5.7
CURRENT USAGE 15%

Low current usage & importance, but
modest future growth potential



KEY FACTS

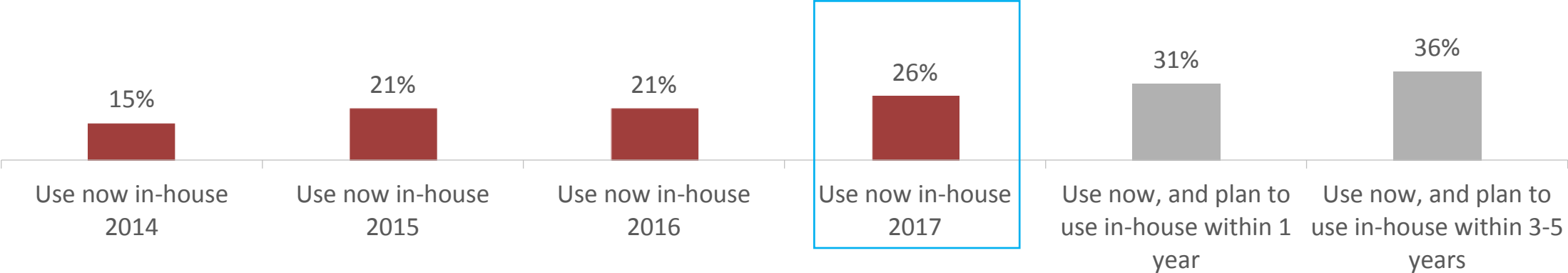
- Observation:** Advanced real-time rendering and visualization shows low current usage and is also low on importance
- Forecast:** Predicted future growth is also below average when compared to all other trends. All groups are likely to drive this increase (industry sectors, regions, company size), other industry sector (not manufacturing or AEC) is over-indexing on future usage of Advanced Real Time Rendering and Visualisation.
- Sectors:** Current usage is higher in EMEA, Manufacturing and Large companies.



Product Lifecycle Management (PLM)

2017 IMPORTANCE MEAN SCORE 6.7
CURRENT USAGE 26%

Good current usage & importance, and reasonable future potential



KEY FACTS

- Observation:** PLM has the potential to be a growth area in today’s market, with above average importance.
- Forecast:** Usage is stable y-on-y however an increase in the usage is predicted. The predicted increase in usage is anticipated as around 20% in the next 12 months.
- Sectors:** Americas, Manufacturing sector and large companies are over-indexing on the current usage of PLM.
- Benefits:** Siemens Teamcenter (21%) and PTC Windchill (17%) continue to be the main products used, although ~20% do not know what they use/plan to use. Perceived benefits are savings on design time (55%), design improvements (49%), cost savings (46%) and faster time to market (41%) *(based on those using or planning to use PLM – 206)*.

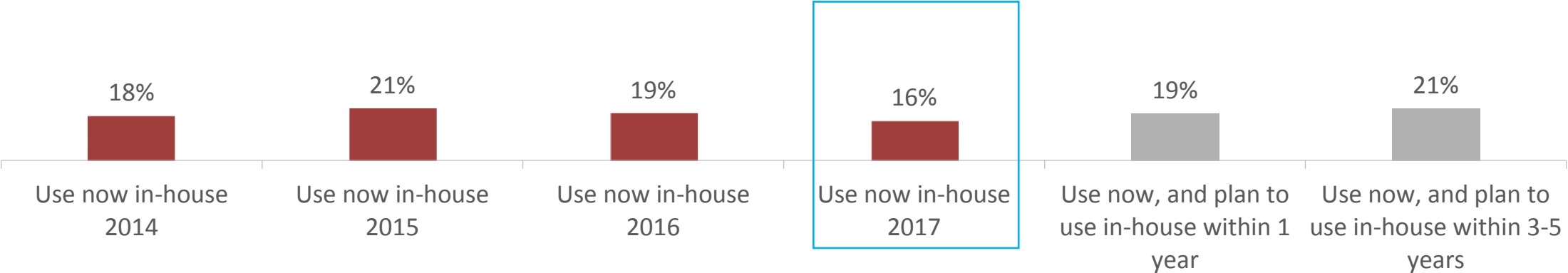




Building Information Modelling (BIM)

2017 IMPORTANCE MEAN SCORE 5.9
CURRENT USAGE 16%

Low current usage & importance, but limited future potential



KEY FACTS

- Observation:** BIM is a niche trend with low usage and average importance.
- Forecast:** Predicted future growth is below average. Naturally AEC and also Small companies are likely to drive this increased usage in the next 12 months. All groups are equally likely to drive the modest increase in usage in the next 3-5 years.
- Sectors:** Current usage of BIM is higher in Americas, and with medium and large companies.
- Benefits:** Benefits of using BIM are seen as design improvement (64%), savings on design time (57%) and cost savings (47%), as well as faster response times to market (34%) *(based on those using or planning to use BIM)*.

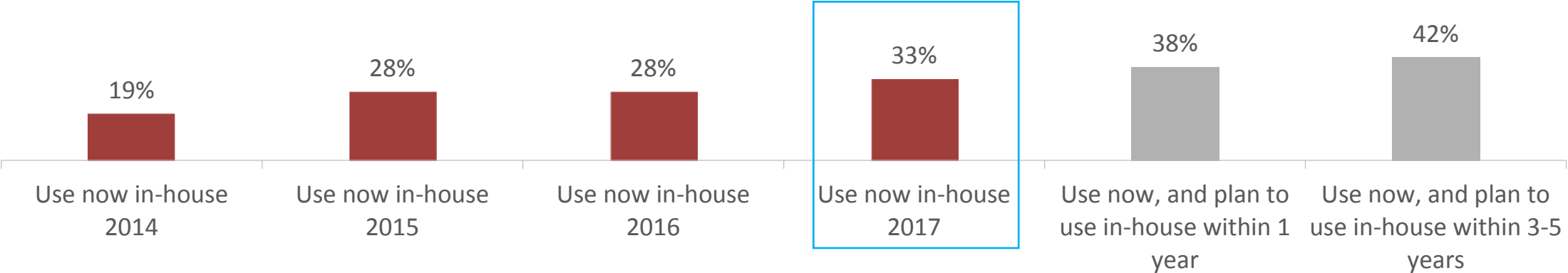




Product Data Management (PDM)

2017 IMPORTANCE MEAN SCORE 7.4
CURRENT USAGE 33%

Good current usage & high importance,
limited future potential



KEY FACTS

Observation: PDM is a leading trend with good levels of current usage and high importance.

Forecast: Some future growth is predicted, although this is below the average across all trends. The Other industry sector (not Manufacturing or AEC) is likely to drive this increase in usage in the next 12 months. All groups and sectors are equally likely to drive the increased usage in the next 3-5 years.

Sectors: Significantly higher usage in the Americas and EMEA compared to APAC. Manufacturing sector and large companies are also driving current usage.

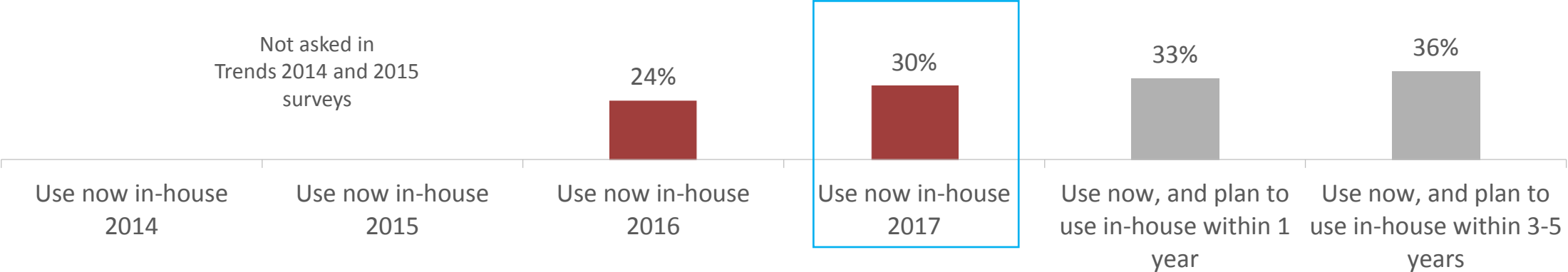




CAM

2017 IMPORTANCE MEAN SCORE 6.1
2017 USAGE 30%

Good current usage, average importance, but limited future potential



KEY FACTS

- Observation:** CAM has slightly above average current usage and importance.
- Forecast:** Future predicted growth potential is relatively low. All sectors and groups are equally likely to drive the increased usage in the next 12 months (especially the Other industry sector not AEC or Manufacturing). All groups are equally likely to drive the increase in usage in the next 3-5 years.
- Sectors:** Higher usage in EMEA, Manufacturing sector and large companies are also more likely to be using CAM at present.
- Current Use:** MasterCAM (26%), CAM for Fusion (14%) and SolidCAM (11%) are the most used CAM products.

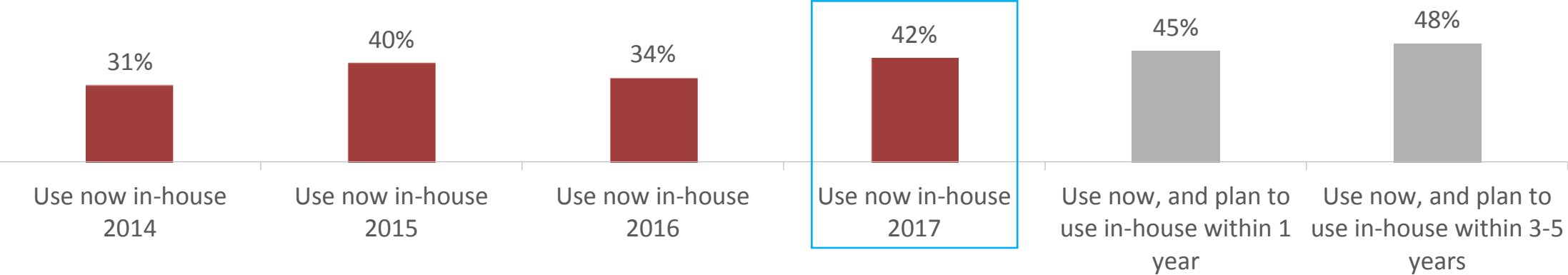




Simulation/CAE

2017 IMPORTANCE MEAN SCORE 7.1
CURRENT USAGE 42%

Good current usage, high importance, but low future growth potential



KEY FACTS

- Observation:** Simulation is a leading trend with above average usage and importance, this trend is also up y-on-y on usage.
- Forecast:** There is seen to be limited potential for future growth (predicted growth in 3-5 years estimated at 17%). All groups (except for AEC and Large companies) are likely to drive increase in usage in the next 12 months. EMEA is most likely to drive this increased usage in 3-5 years.
- Sectors:** More likely to be used currently in large companies. Manufacturing sector, and EMEA.
- Benefits:** Simulation is seen mostly for design optimisation, prediction of product performance and validate design decisions (*base: Using or planning to use*).

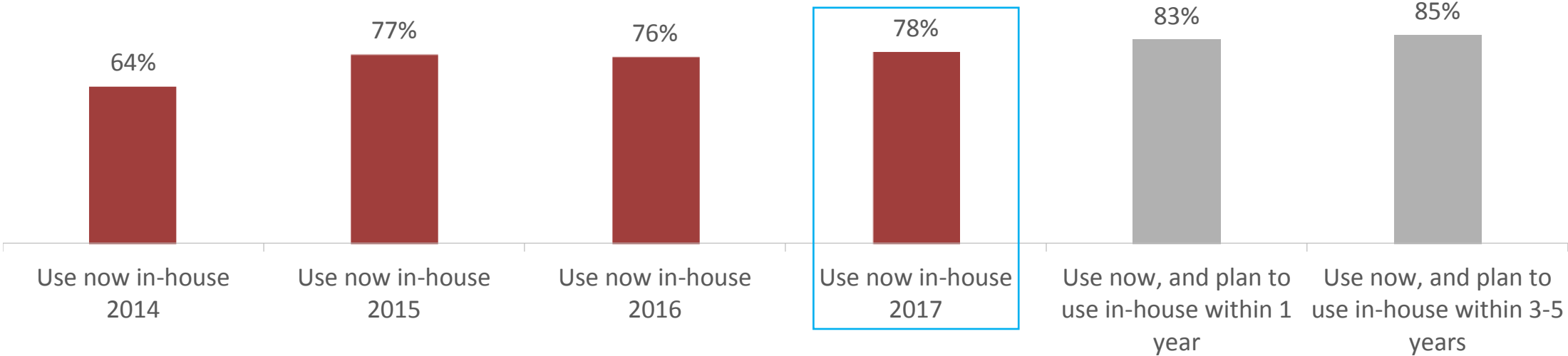




3D Modelling

2017 IMPORTANCE MEAN SCORE 8.6
CURRENT USAGE 78%

Very high current usage & most important trend, but very little room to grow



KEY FACTS

- Observation:** 3D Modelling is a leading trend with the highest importance and usage ratings.
- Forecast:** Future predicted growth potential is very limited, due to already very high current usage. Other industry sector (not Manufacturing or AEC) is likely to drive this increase in usage in the future.
- Sectors:** High current usage in EMEA, Manufacturing, and among large companies.

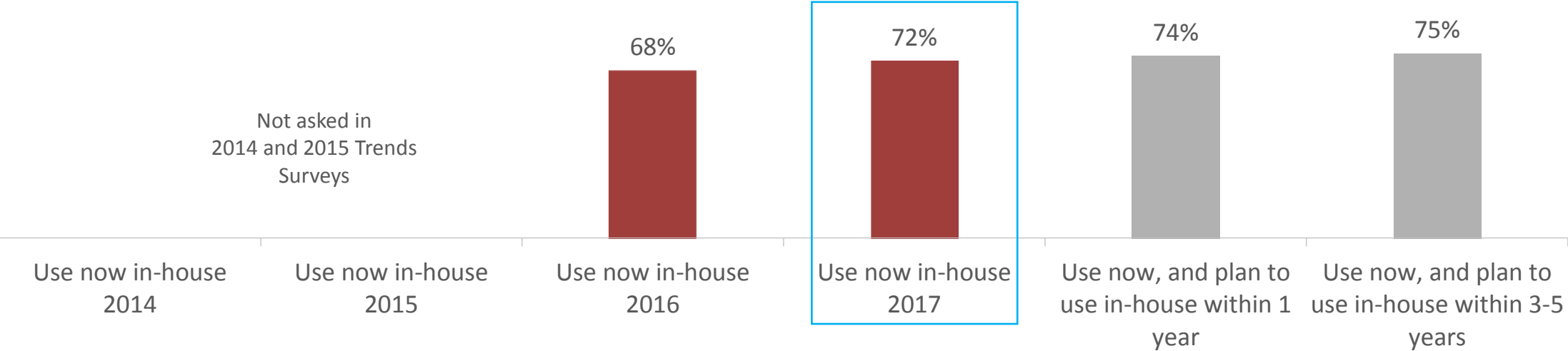




2D Drafting

2017 IMPORTANCE MEAN SCORE 8.0
CURRENT USAGE 72%

High current usage & importance, but almost no future growth potential



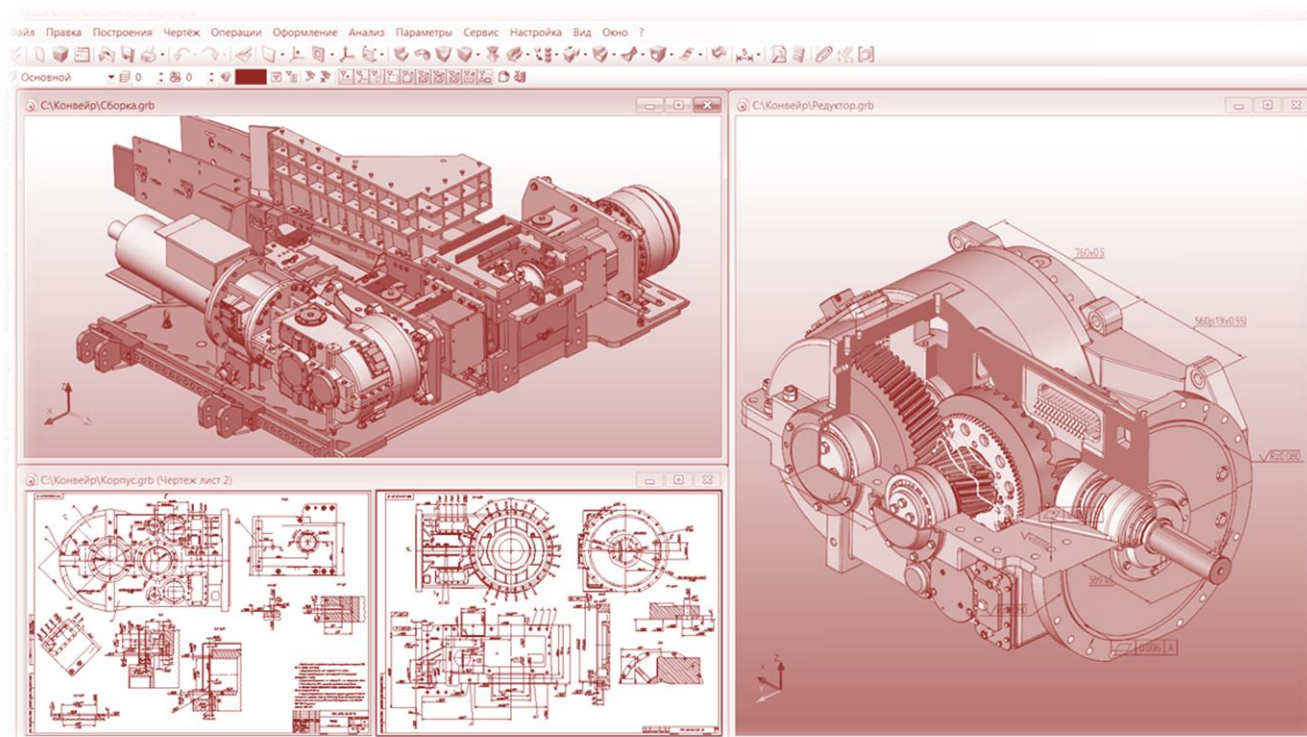
KEY FACTS

- Observation:** 2D Drafting is also a leading trend with very high importance and usage.
- Forecast:** Very limited future predicted growth potential. All groups are likely to contribute to the modest increase in usage in the next 12 months and to the modest increase in usage in the next 3-5 years.
- Current Use:** Across all segments, we see higher current usage in EMEA, Americas as compared to APAC.



CAD Usage

Section Two





Most used CAD Software Packages

10 most used packages	Trends 2017		Segments/Groups driving the usage of these tools....
1	AutoCAD	37%	APAC, AEC and Other industry sectors, Medium companies
2	SolidWorks	21%	Manufacturing, Other industry sectors
3	Inventor	16%	APAC and Manufacturing
4	AutoCAD LT	14%	APAC, AEC sector
5	PTC Creo	11%	Manufacturing, Large companies and EMEA
6	CATIA	9%	EMEA, Manufacturing and Large companies
7	NX	9%	Manufacturing, and Large companies
8	Revit Architecture	7%	AEC industry sector
9	AutoCAD Mechanical	6%	Small companies
10	AutoCAD Civil3D, MicroStation	5%	Civil 3D – Americas, and Other industry sector MicroStation - Large companies





Most used Collaboration Software Tools

10 most used packages		Trends 2017	Trends 2016 ranking (last year)
	Y-on-y change		
1	▲	1=Autodesk A360	1=Autodesk Design Review
2	▲	1=Autodesk Navisworks	2=Autodesk Vault
3	▼	3=Autodesk Design Review	2=Autodesk Navisworks
4	▲	3=Siemens Teamcenter	4=PTC Windchill
5	▼	3=Autodesk Vault	4=Autodesk A360
6	▼	6=PTC Windchill	6=Siemens Teamcenter
7	▲	7=Bentley ProjectWise	7=Autodesk Buzzsaw
8	=	8=SolidWorks Enterprise PDM	8=SolidWorks Enterprise PDM
9	▲	9=SolidWorks Workgroup PDM	8=Bentley ProjectWise
10	▼	9=Autodesk Buzzsaw	10=SolidWorks Workgroup PDM

A significant majority (64%) of participants are either not aware or are not using any collaboration tools at the present time (2017):

44% - Do not use

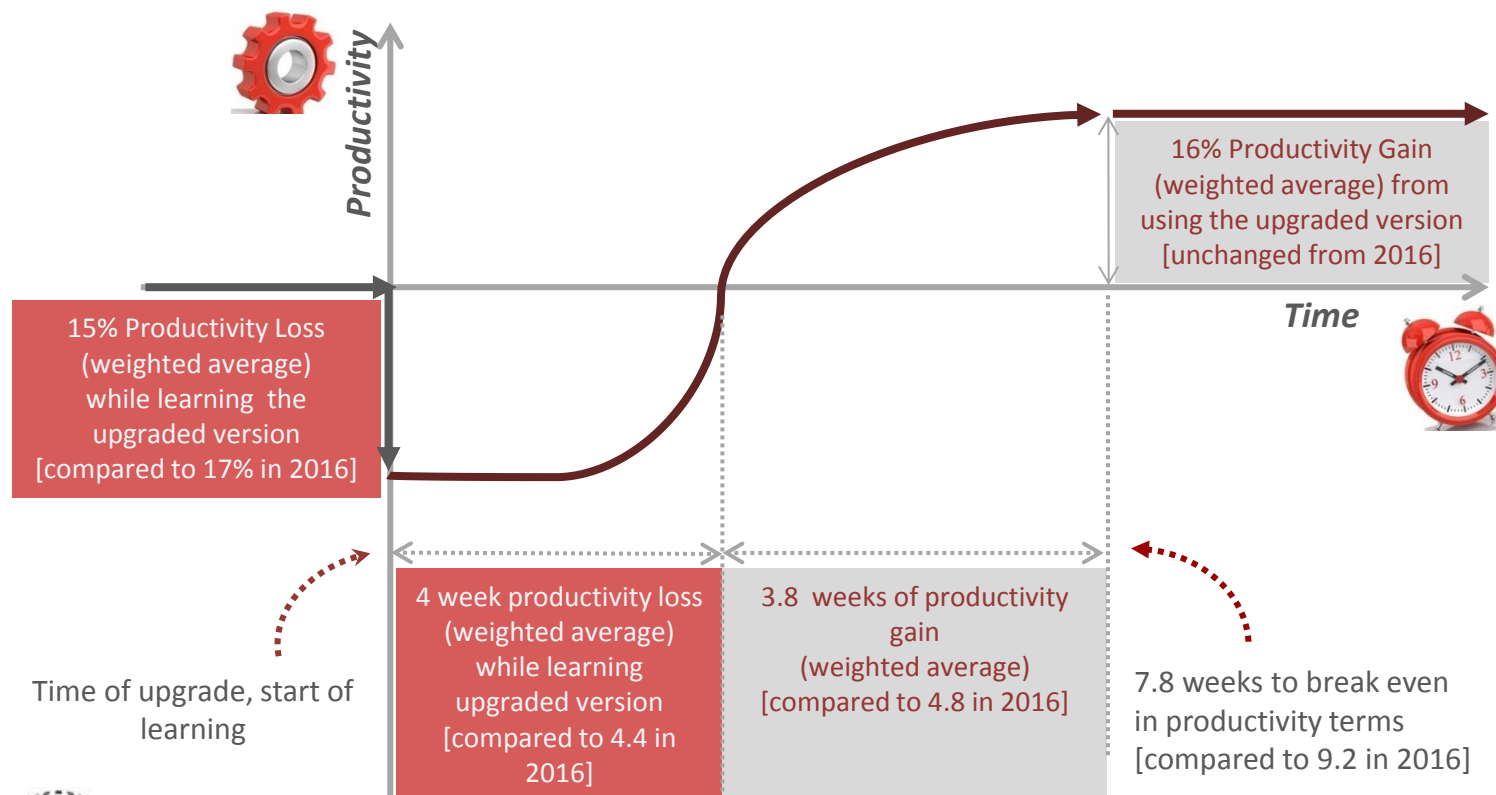
13% - Don't know

7% - Not stated



Value in Software Upgrades

Half of those surveyed (51%) had upgraded, changed or added to their CAD software in the last 12 months, so were asked a series of questions around productivity during transition

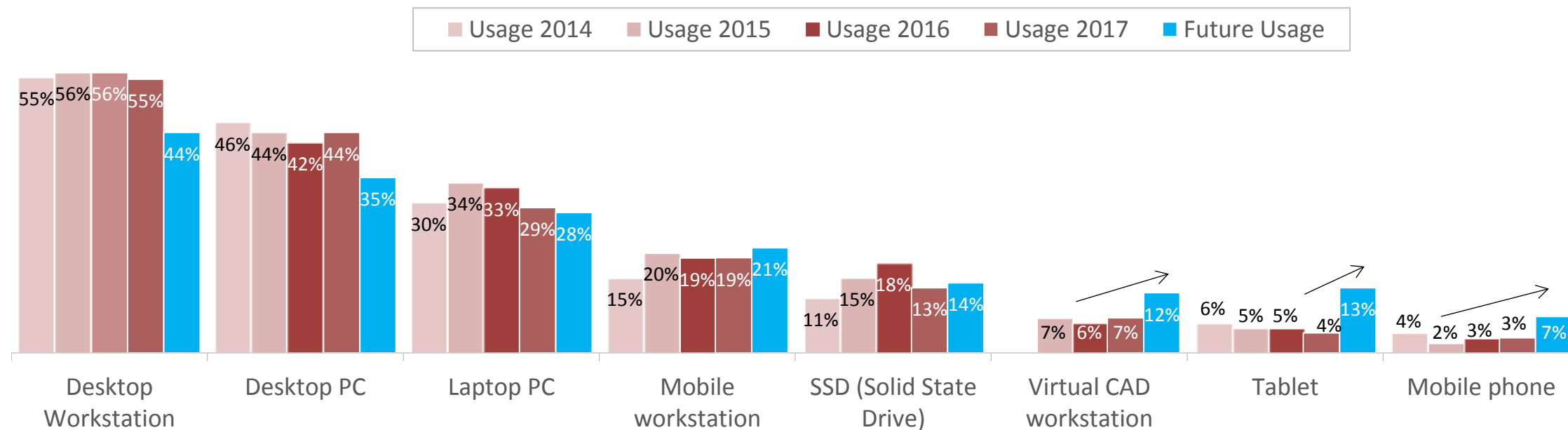


- The results show that on average CAD upgrades break even (in productivity terms) in just under 2 months (an improvement since 2016) and thereafter continue to produce productivity gains



Current and Future Usage of Hardware

WHAT HARDWARE IS BEING USED, AND WHAT WILL BE USED NEXT?



KEY FACTS

Observation: We see a year-on-year fall in the usage of Desktop Workstations, Laptop PC's and SSD's. The current usage of Desktop PC's is up y-on-y and Mobile Workstation and Virtual CAD Workstation is stable y-on-y.

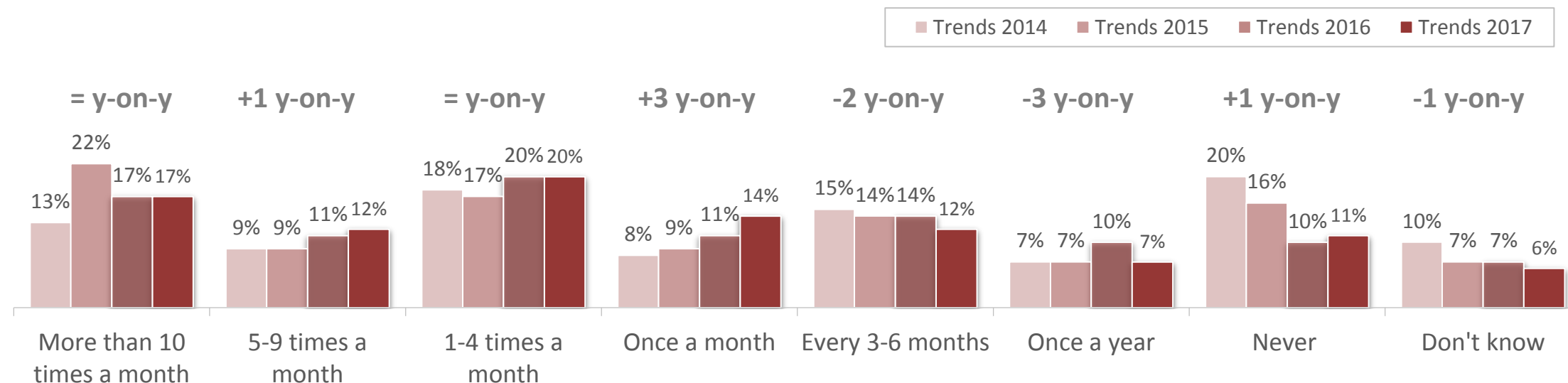
Forecast: Predicted increase in future use of Mobile Workstations, Virtual CAD Workstations, Tablet and Mobile Phones.





Frequency of Downloading 3D Models

TREND 2017 AND Y-ON-Y COMPARISON



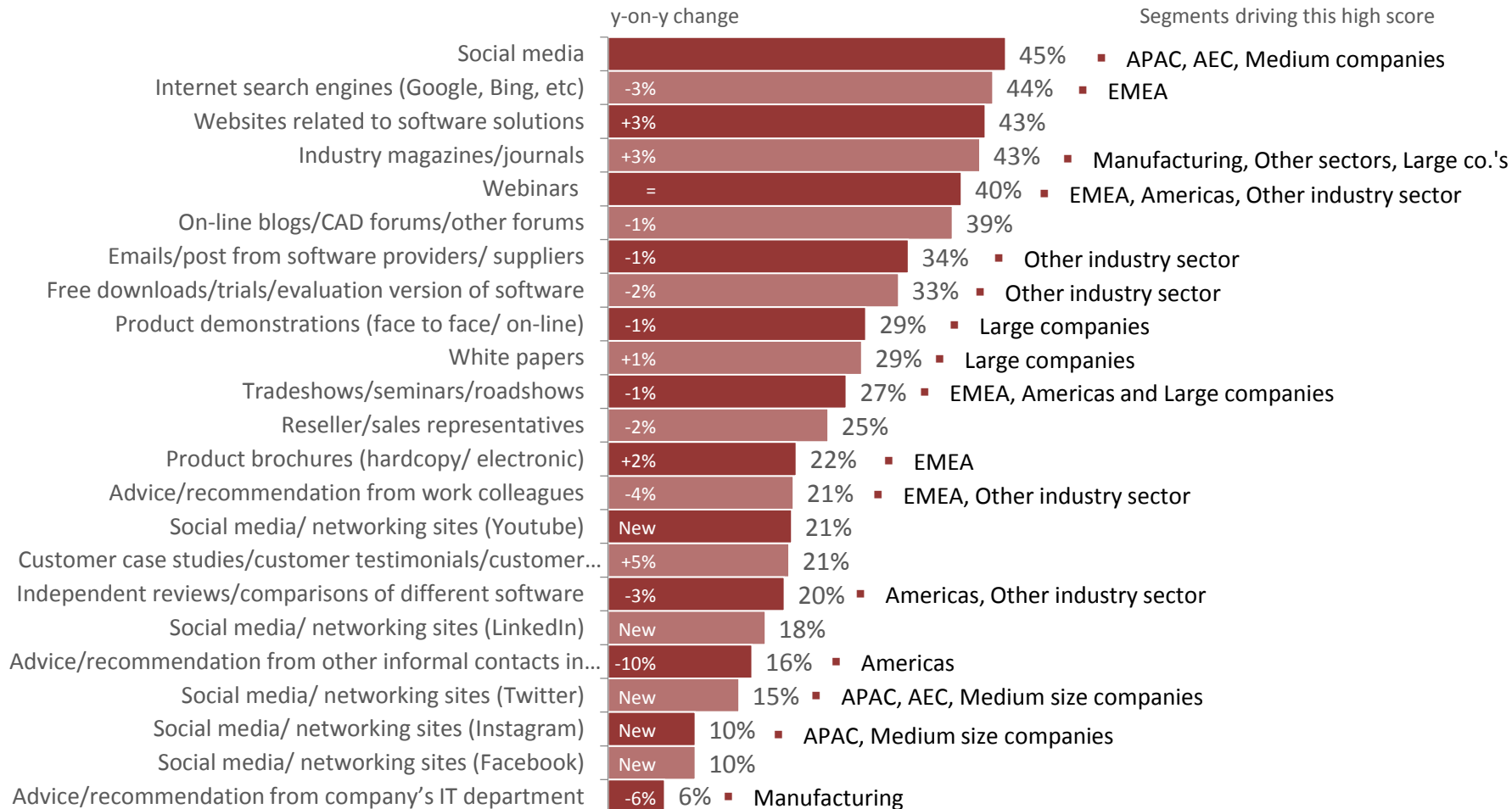
- The percentage of those never downloading is stable year-on-year at 1 in 10
- Overall increase in the number of users downloading 3D Models at least once a month



Bold font - Significant shifts 2015-16 @95% levels
Were this procedure to be repeated on multiple samples, assuming other variables are the same, 19 out of 20 times we should get similar results



Popular Sources of Information on the CAD Industry



* Shows significant difference between regions @95% level

KEY FACTS

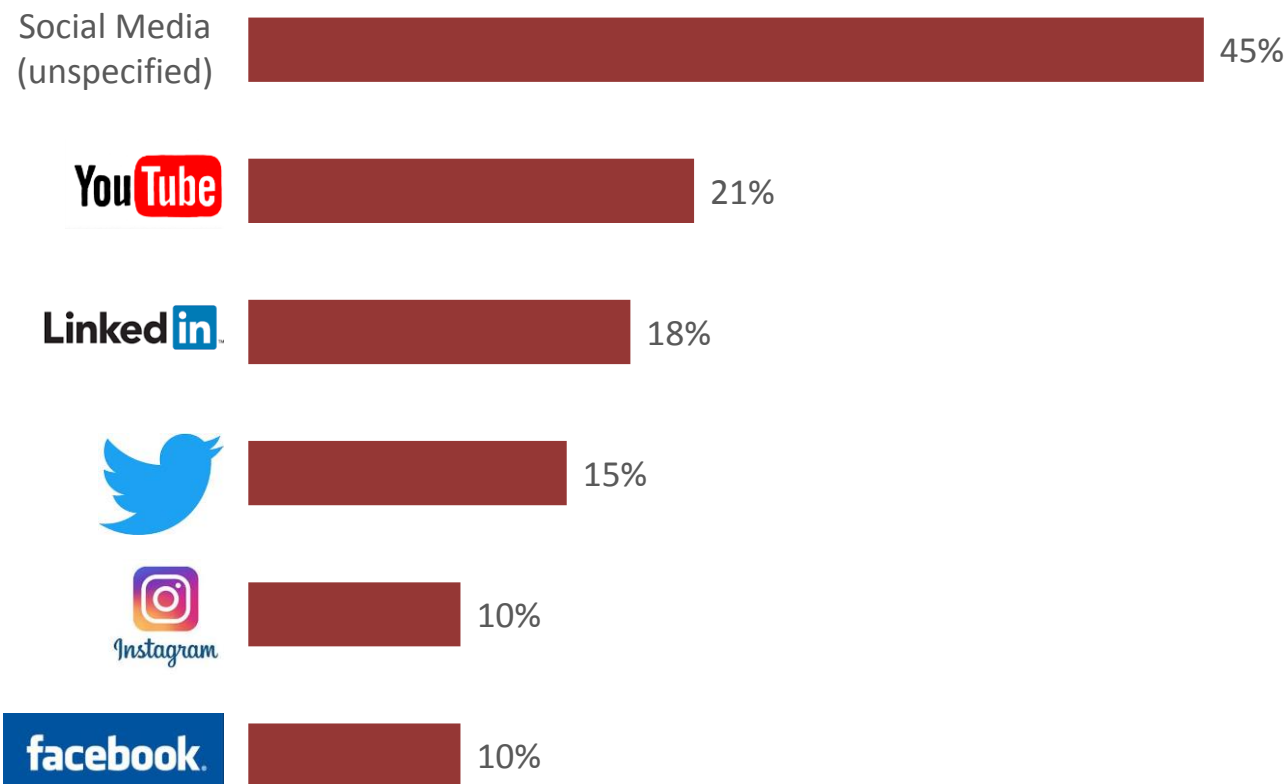
- Social Media as an information source is the most used in 2017: (this question was asked in a different way in previous years, so no direct comparison is possible)
- Use of Social Media followed by Search Engines, Company Websites and Industry Magazines/Journals are the most used sources





Social Media in Focus

As a popular Source of Information on the CAD Industry



KEY FACTS

- In 2017, usage of different social media platforms was broken out in the prompted list shown to respondents. (previously an overarching code to cover all social media was used)
- YouTube and LinkedIn are the most used platforms amongst the CAD/CAM audience, and this is the case across subgroups
- Twitter and Instagram are used more in APAC and in the AEC Sector





Technical Survey Information

Appendices





Notes on Analysis

YEAR-ON-YEAR SURVEY SAMPLE

- This study has been conducted over four consecutive years. To ensure comparability and so that any changes in the results are true and not a result of different sample profiles, the same weighting by industry sector and company size has been applied to each year's data
- CAD Trends results were reviewed as a whole, and by individual industry sector. For the consolidated results, sectors within each tier were given the same weighting factor:
 - Tier 1: AEC and Manufacturing
 - Tier 2: Process & Plant and Other
 - Tier 3: Education, Government and Utilities





Notes on Analysis

WEIGHTING FACTORS

- Sample profile was slightly weighted to match previous years, factors were applied as follows:
 - Sector weighting
 - Manufacturing no weighting
 - AEC weighted up by 2%
 - Utilities weighted down by 2%
 - Education weighted up by 2%
 - Other sector weighted down by 3%
 - Region weighting
 - EMEA weighted down by 2%
 - Americas weighted up by 1%
 - APAC weighted up by 2%





Notes on Analysis (Continued...)

- All bases shown in the report are unweighted – demonstrating the actual sample size, not its weighted equivalent
- In looking at future usage, we have made the assumption that current usage will continue, therefore future usage is an incremental addition to current usage
- All differences mentioned within the report are statistically significant at the 95% confidence level





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CAD Trends Industry Reports for AEC and Manufacturing



CAD Trends in the AEC Sector
Architectural, Engineering and Construction

CAD Trends in AEC 2017

There are also many deeper insights available in this report specific to the AEC sector. This report is based on **272** global participants who are designers, engineers, architects and managers in the AEC sector.

The survey reports...

- ...perceived importance
- ...actual usage of these trends
- ...potential future usage of these trends over time
- Analysis on these 15 trends by geographic regions and size of company
- Year-on-year changes in awareness
- Perceived importance and current usage of these 15 trends specific to the AEC sector

Find out more about this report, click [here](#)

CAD Trends in the Manufacturing Sector

CAD Trends in Manufacturing 2017

There are also many deeper insights available in this report specific to the Manufacturing sector. This report is based on **245** global participants who are designers, engineers and managers in the Manufacturing sector.

The survey reports...

- ...perceived importance
- ...actual usage of these trends
- ...potential future usage of these trends over time
- Analysis on these 15 trends by geographic regions and size of company
- Year-on-year changes in awareness
- Perceived importance and current usage of these 15 trends specific to the Manufacturing sector

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