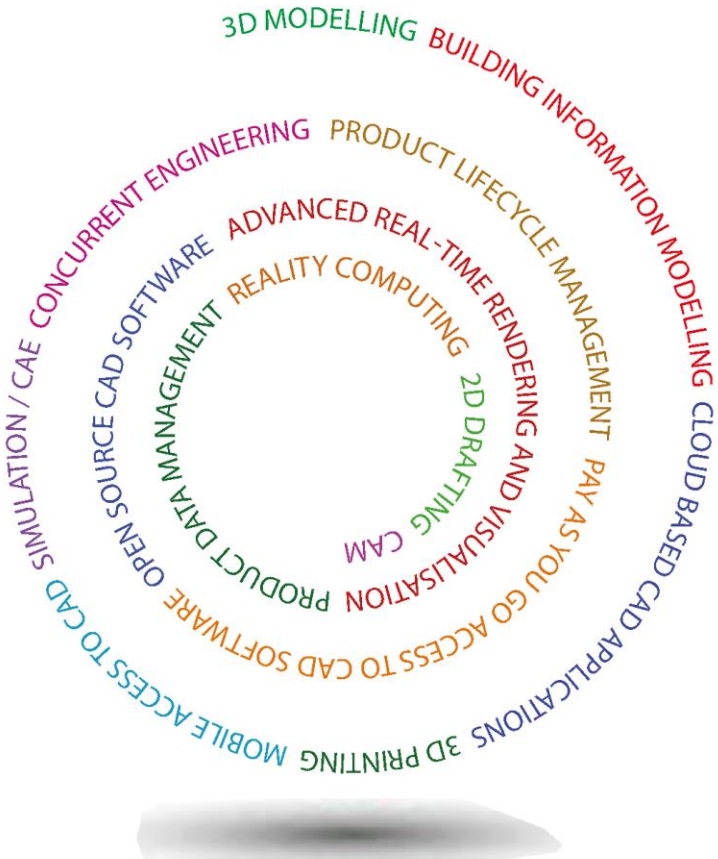
Business Advantage
intelligence insight innovation

CAD TRENDS 2016



Agenda

Looking to the Future

Purpose

- **Future planning** is key for any business
- We **want to assist you with 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 Nov. 2015, allowing comparison with the survey results from 2013 and 2014
- Survey managed from our offices in London and San Francisco, drawing respondents from our in-house data repository of over 500,000 CAD/CAM users and decision makers and other data sources
- Sample of **610 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**

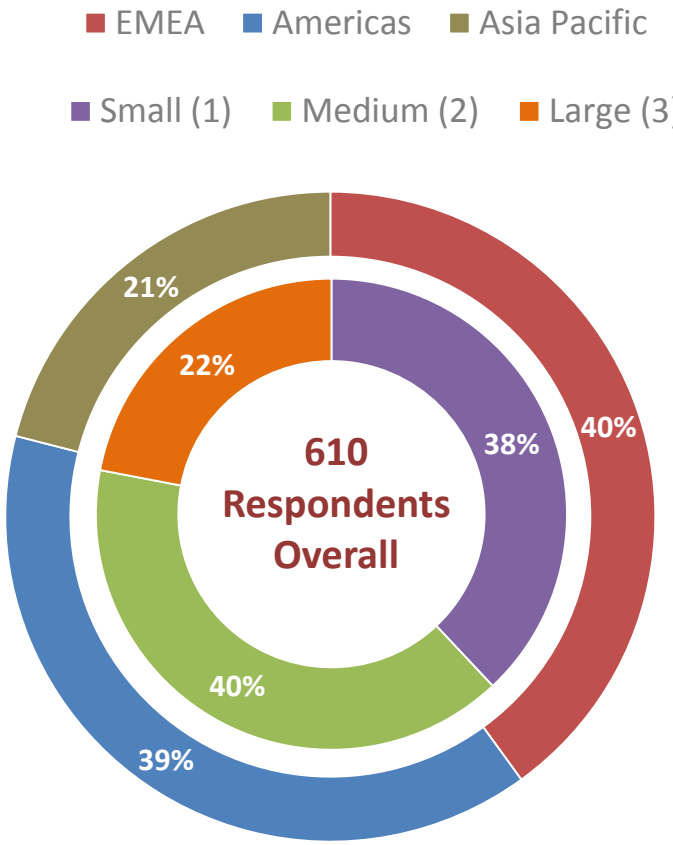
Key Topics

15 Key CAD trends were identified for the survey this year – two were added for 2016 – so year-on-year comparison is feasible for the remainder

- 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. Perceived Importance	Q. Current and Future Usage
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: 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: 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 2016 Survey Audience N=610

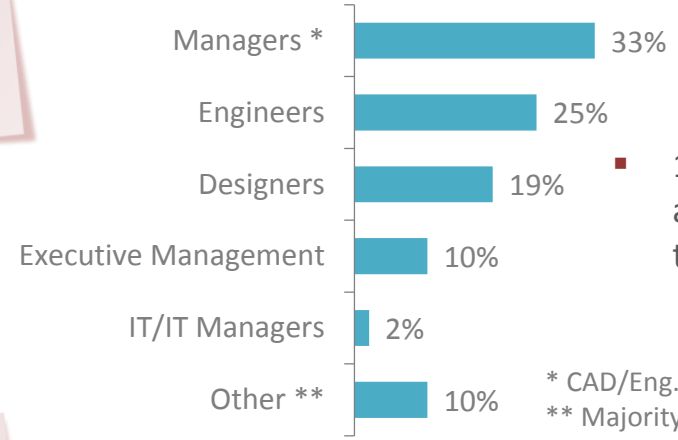


- Even split between EMEA & North America
- 8 in 10 are SMEs

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

Job Title

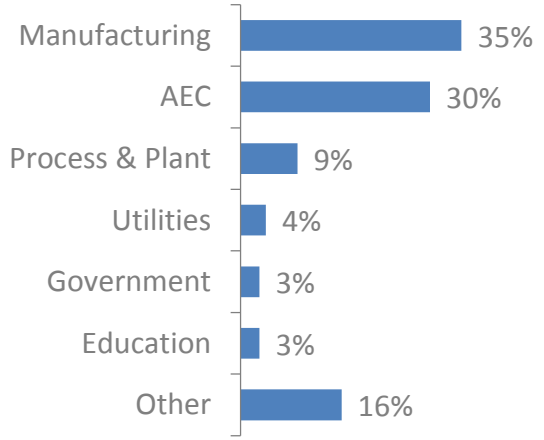
Respondents' Profile



- 1 in 3 respondents are managers in their company

* CAD/Eng./Design/Tech./Project
** Majority are in Education related roles

Sector



CAD Trends
2016

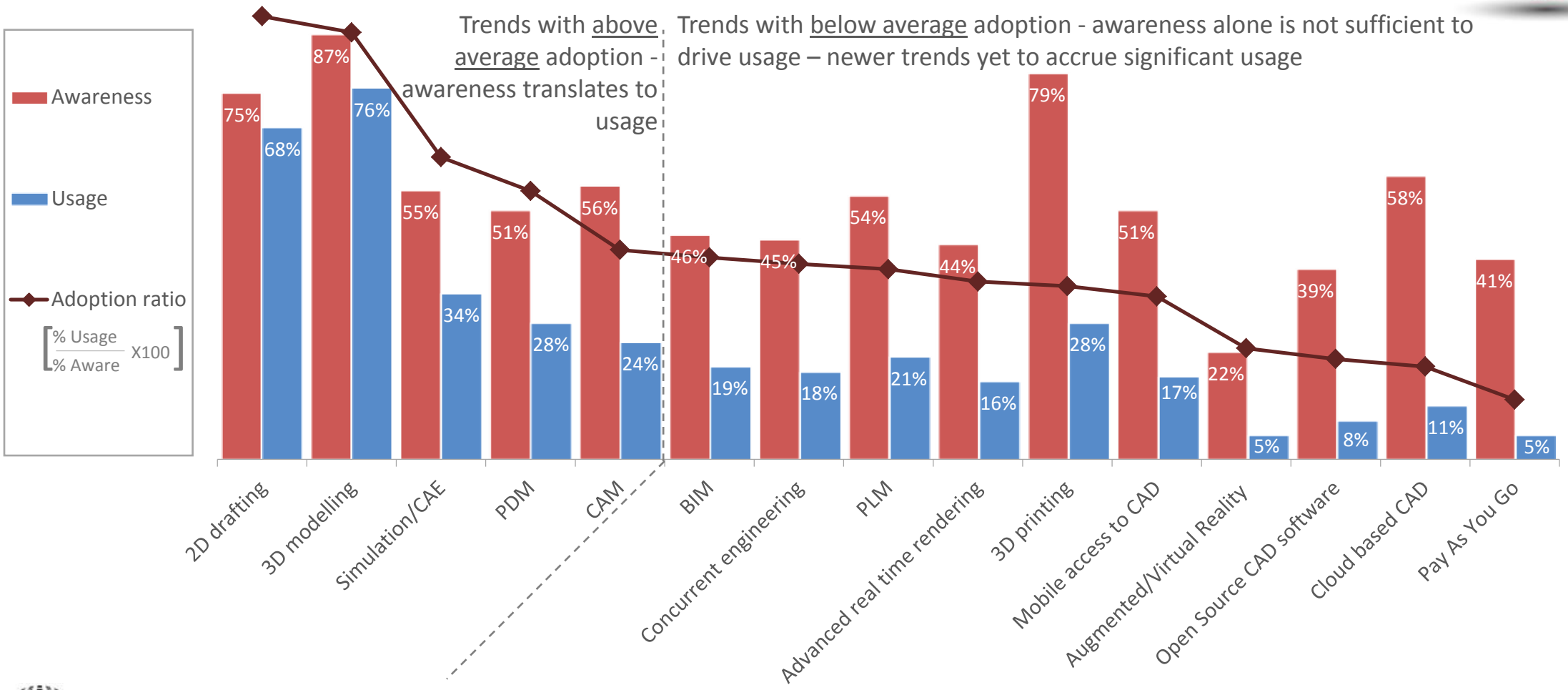
Key Trends Overview

Section One

Business Advantage
intelligence insight innovation

Current Trends Snapshot

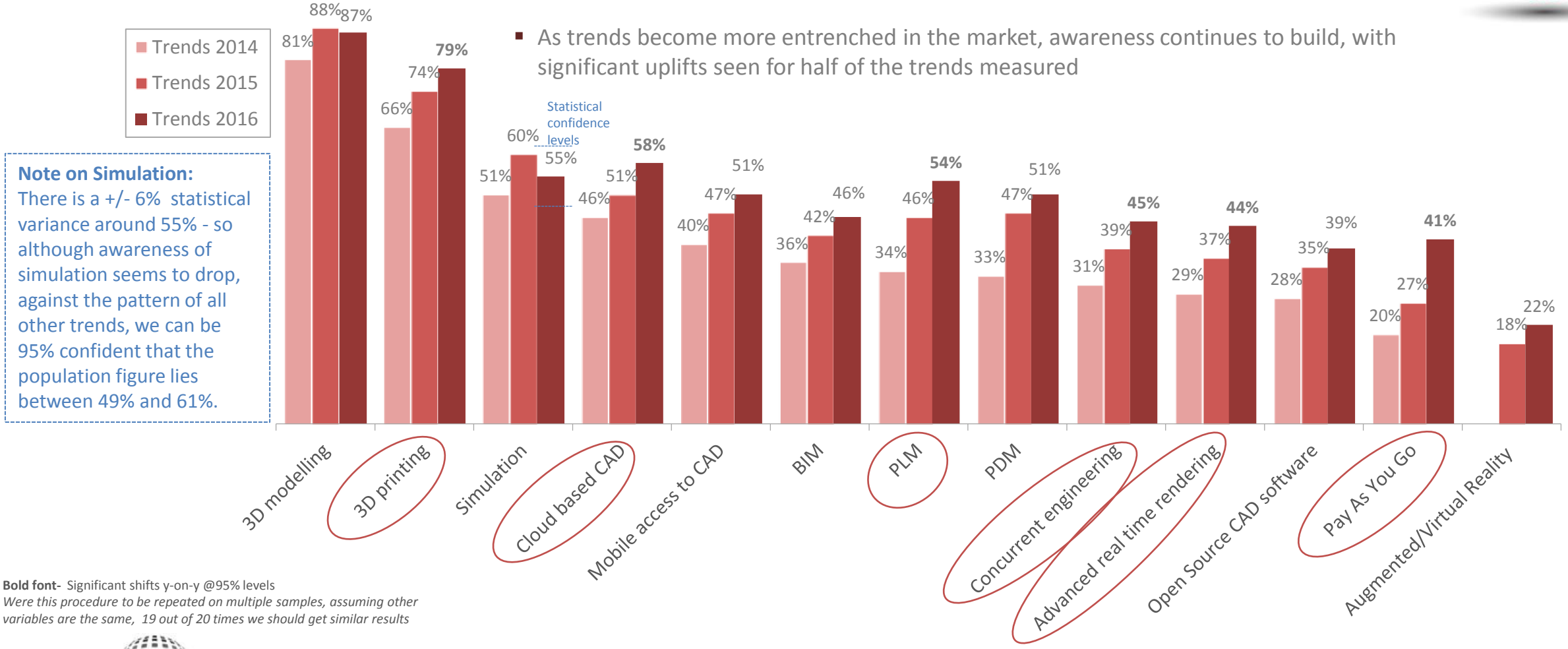
2016 AWARENESS AND CURRENT USAGE



Business Advantage
intelligence insight innovation

Q. Which of the following leading trends are you familiar with or have you heard of? (Base: All – 610)
Q. Thinking about these trends again what do you/your company already use in-house at the moment? (Base: All – 610)

Change in Awareness Over Time



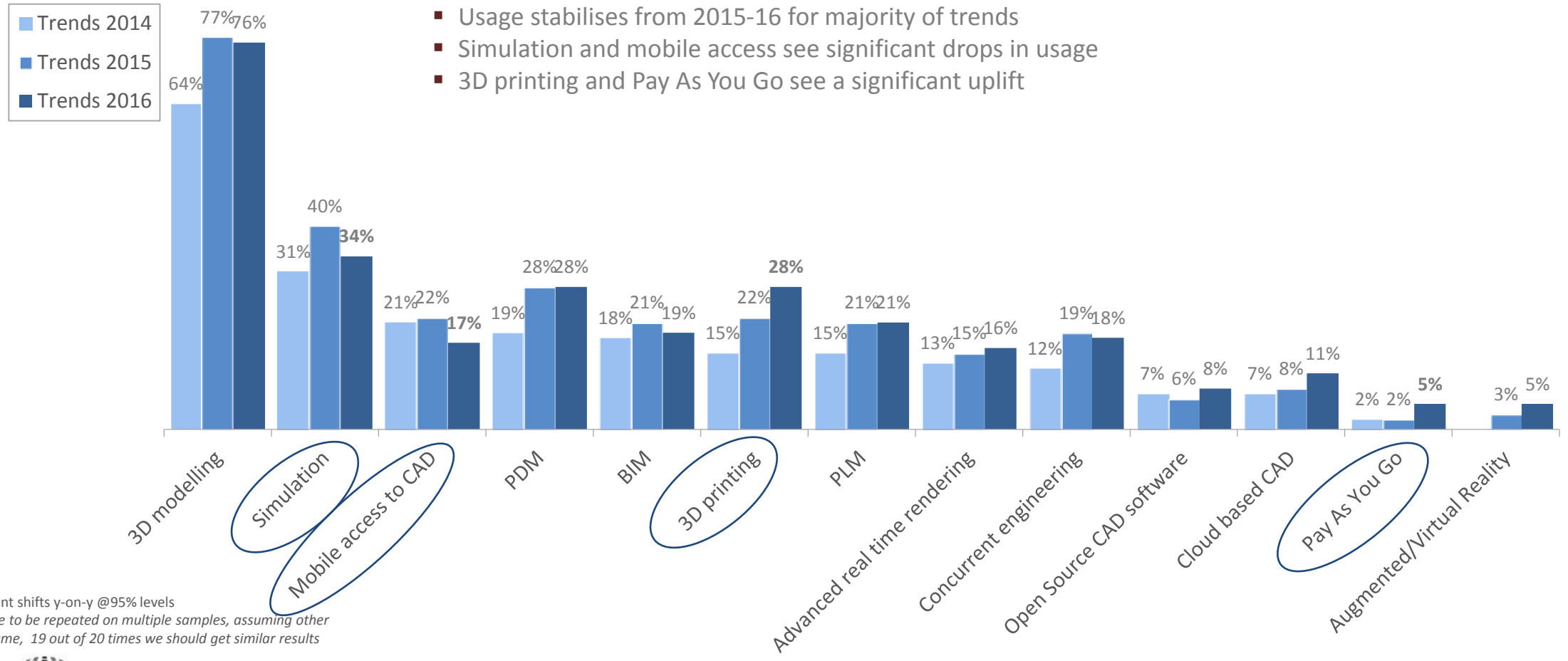
Note on Simulation:
There is a +/- 6% statistical variance around 55% - so although awareness of simulation seems to drop, against the pattern of all other trends, we can be 95% confident that the population figure lies between 49% and 61%.

Bold font- Significant shifts y-on-y @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

Business Advantage
intelligence insight innovation

Q. Which of the following leading trends are you familiar with or have you heard of?
(Base: All: 2014 – 409, 2015 – 635, 2016 – 610)

Change in Usage Over Time



- Usage stabilises from 2015-16 for majority of trends
- Simulation and mobile access see significant drops in usage
- 3D printing and Pay As You Go see a significant uplift

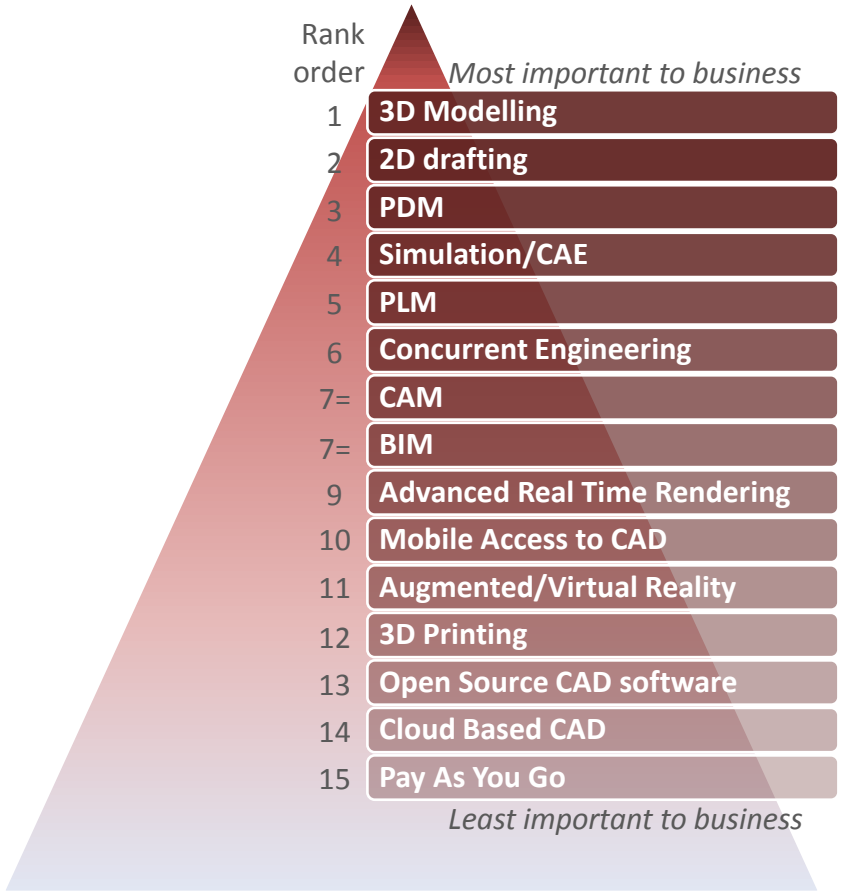
Bold font- Significant shifts y-on-y @95% levels
Were this procedure to be repeated on multiple samples, assuming other variables are the same, 19 out of 20 times we should get similar results

Business Advantage
intelligence insight innovation

Q. Thinking about these trends again what do you/your company already use in-house at the moment?
(Base: All: 2014 – 409, 2015 – 635, 2016 – 610)

Current Trends – Importance Snapshot

CAD TRENDS IMPORTANCE RANKING 2016

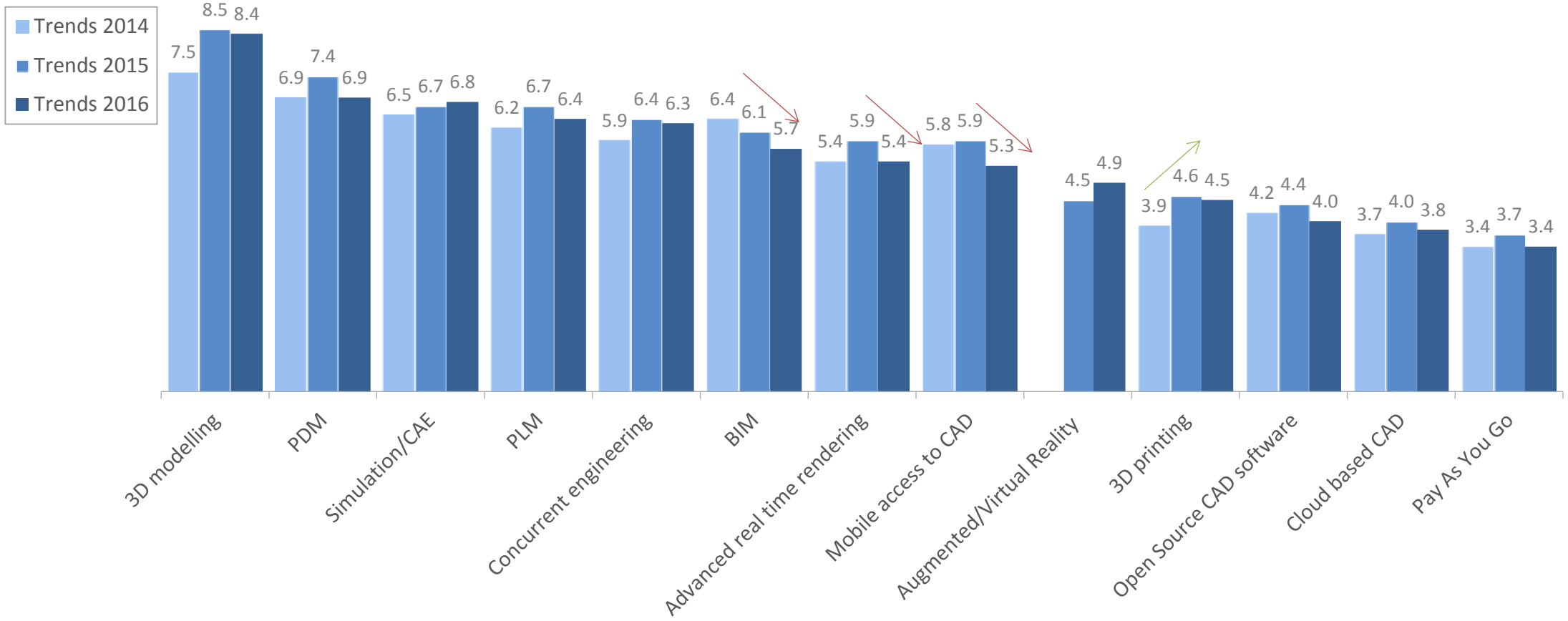


(= implies similar rank order for two or more trends)

- Some CAD trends are significantly more important to particular sectors, regions and company types…
  - 2D Drafting, Mobile access to CAD and Augmented/ Virtual Reality are significantly more important in AEC
  - Understandably, BIM also in AEC
  - PDM, CAM and 3D Printing in Manufacturing
  - PLM in Manufacturing and large companies
  - Simulation/CAE in large companies
  - Concurrent engineering in medium and large companies
  - Open Source CAD in EMEA and the Americas, as well as AEC

Absolute Importance Over Time

MAJORITY OF TRENDS RETURN TO 2014 IMPORTANCE LEVELS



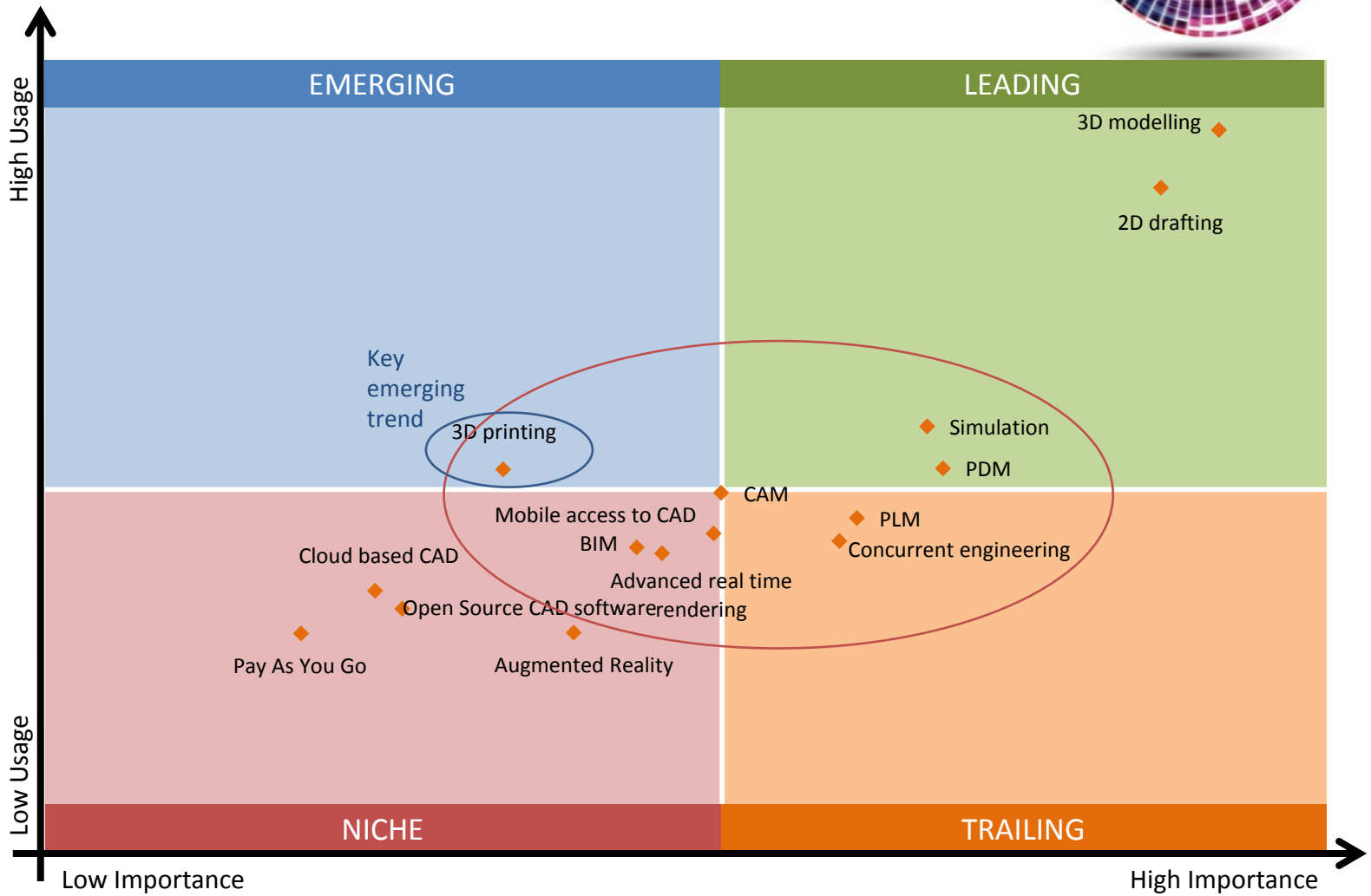
Business Advantage
intelligence insight innovation

Q. Thinking about your core business functions, to what extent do you see each of these as an important trend to your company?
(Base: All aware of each – 2014 – 46-330 , 2015 – 94-555, 2016 – 138-525)

Snapshot of Usage and Importance

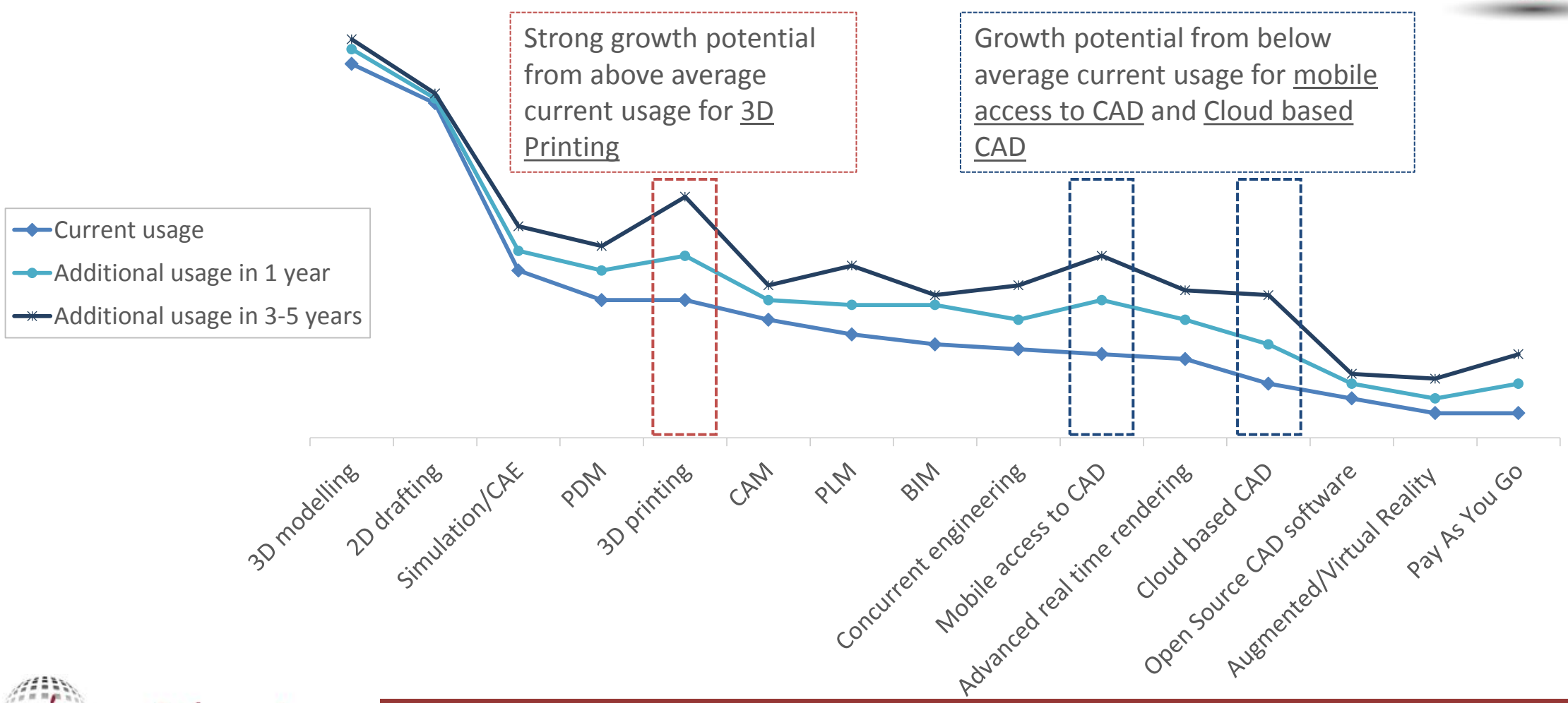
2016 USAGE AND IMPORTANCE

- This chart plots perceived importance of trends against current usage
- The market is still strongly focused on 3D modelling, and 2D drafting (added in 2016) occupies a similar space
- There are however a number of trends following on which will become increasingly key for CAD software/solution providers



Looking to the Future

PREDICTED FUTURE USAGE



Diagnostics on Current Usage & Future Potential

2016 CAD Trends ranked by future growth potential –
additional analysis in sectors with appreciable differences in current / future usage

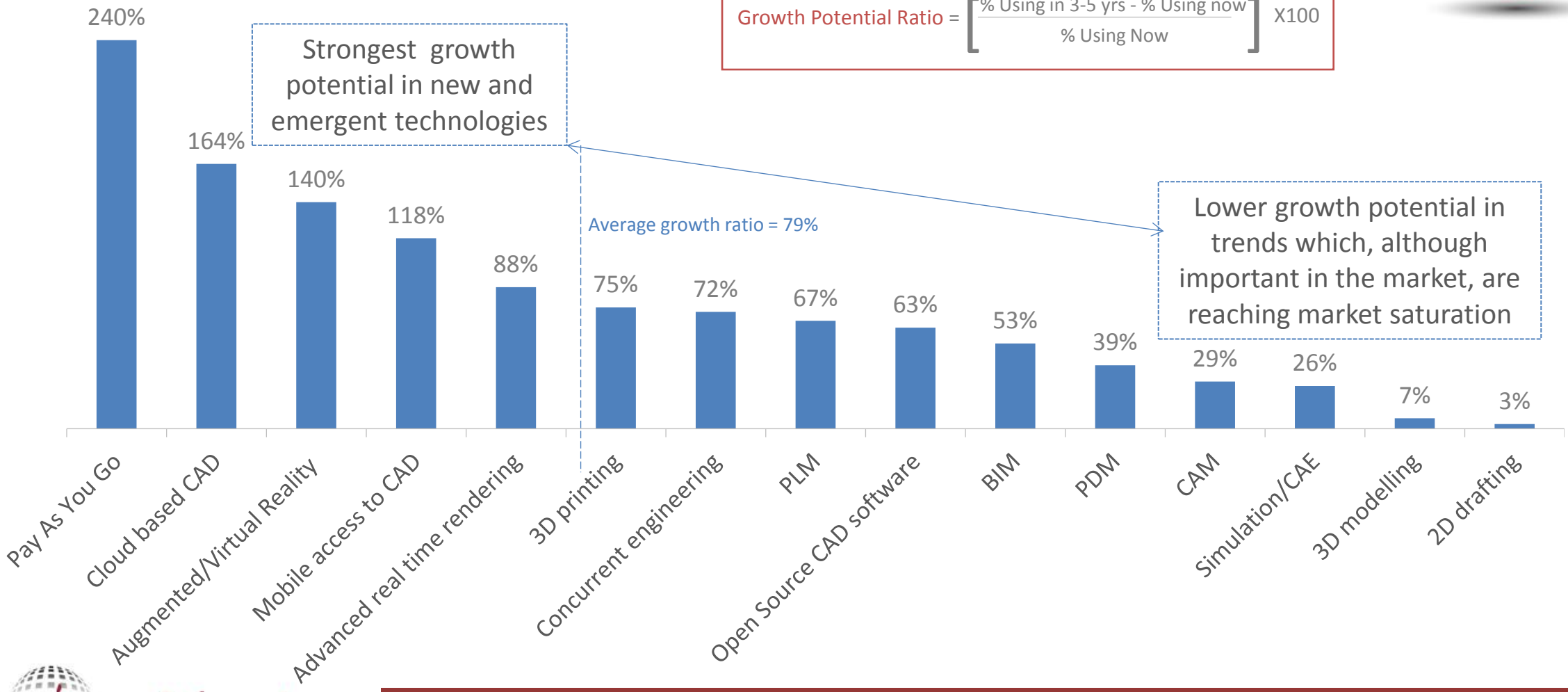
Mapping Future Potential

- 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

Growth Potential Ratio = [(% Using in 3-5 yrs - % Using now) / % Using Now] X100

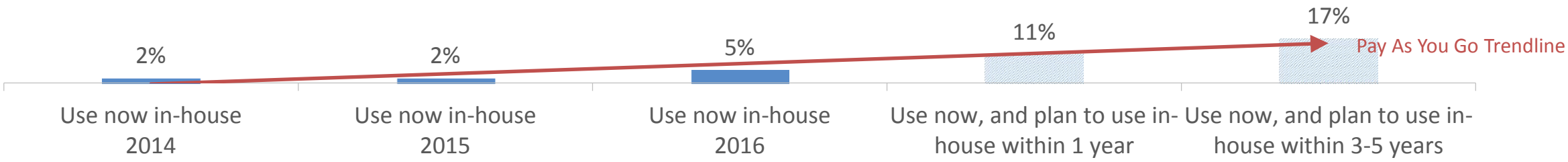


Growth Potential Ranking = 1st/15
Importance Ranking = 15th/15

Pay As You Go

2016 IMPORTANCE MEAN SCORE 3.4
2016 USAGE 5%

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



KEY FACTS

Observation: Very niche area in today's market with low importance and very low usage – but usage doubled year on year, albeit from a low base.

Forecast: Predicted future growth is very strong but from a low baseline. A significant uplift in usage was seen from 2015 to 2016, indicating there could be movement in this area.

Sectors: Due to the low starting point, there are no significant differences between industry sectors, company size or geographic regions. Future interest also does not appear to come from one area in particular, but this is certainly a trend to watch over the coming year.

Business Advantage intelligence insight innovation

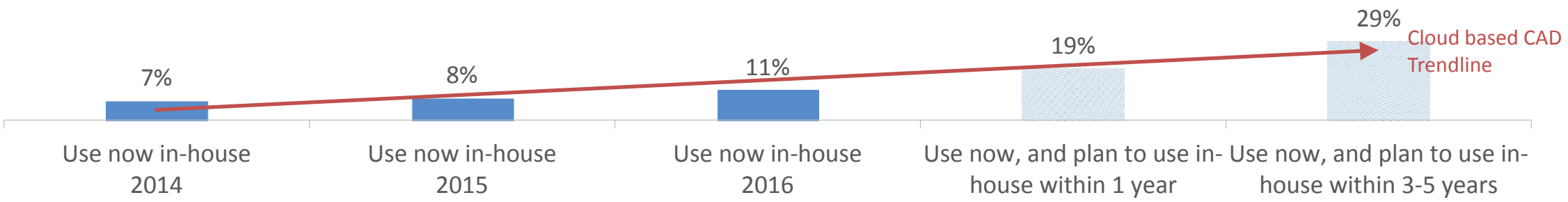
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 243)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 2nd/15
Importance Ranking = 14th/15

Cloud Based CAD Applications

2016 IMPORTANCE MEAN SCORE 3.8
2016 USAGE 11%

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.

Sectors: There are no major differences by industry sector, company size and geographic region – current usage is consistently around 1 in 10. There are some indications that long term future growth is more likely to come from the Americas and EMEA than APAC.

Benefits: The perceived benefits of cloud based CAD are higher mobility (67%), ease of updating software (47%), cost reductions (46%) and increased storage capacity (32%). *(based on those using or planning to use Cloud based CAD – 180)*

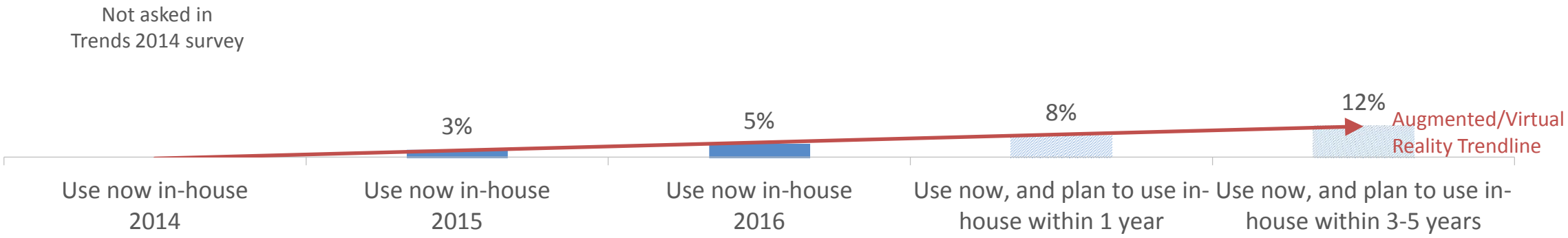
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 348)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 3rd/15
Importance Ranking = 11th/15

Augmented/Virtual Reality

2016 IMPORTANCE MEAN SCORE 4.9
2016 USAGE 5%

Low current usage & importance, but strong future potential



KEY FACTS

Observation: Augmented / Virtual Reality remains a very niche area in today's market with relatively low importance (although this remains stable year on year) and low usage.

Forecast: Future growth predictions are high but from a low base level of current usage – 1 in 20 are current users.

Sectors: Low usage is evident across all industry sectors, sizes and geographic regions, and there is no particular standout area for predicted future growth – similar levels are seen across all subgroups

Business Advantage intelligence insight innovation

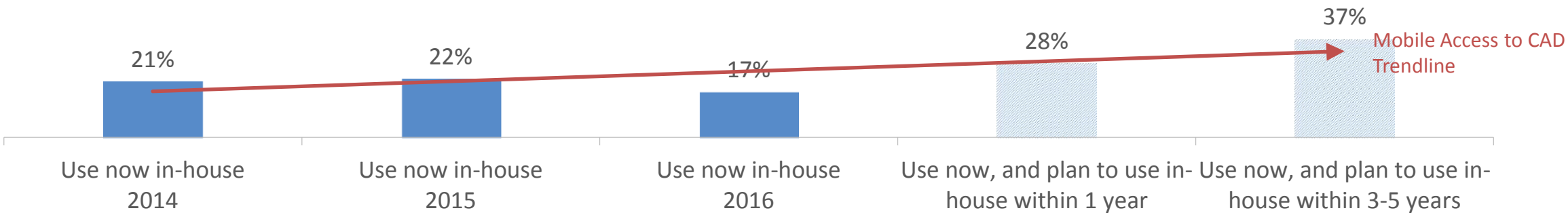
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 138)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 4th/15
Importance Ranking = 10th/15

Mobile Access to CAD

2016 IMPORTANCE MEAN SCORE 5.3
2016 USAGE 17%

Relatively low current usage & importance, but good future potential



KEY FACTS

Observation: Mobile Access to CAD is also an area in flux, with a dip in use from 2015 to 2016, and slightly below average importance against other trends.

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.

Sectors: Current usage is significantly lower (9%) in APAC than the Americas and EMEA (both 19%) – and short term (1 year) growth is more likely to come from the Americas than EMEA or APAC. Mobile usage has started to make an impact in the AEC sector where usage is higher (24%) than the Manufacturing or other (both 12%) industry sectors. The government sector in particular seems most open to future growth in this area.

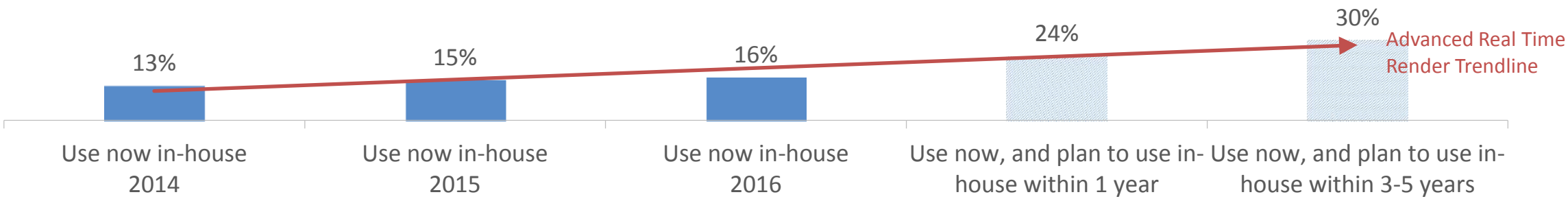
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 299)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 5th/15
Importance Ranking = 9th/15

Advanced Real-Time Rendering and Visualization

2016 IMPORTANCE MEAN SCORE 5.4
2016 USAGE 16%

Relatively low current usage & importance, but above average future potential



KEY FACTS

Observation: Stable trend in today's market, with usage remaining unchanged year on year, and around average importance.

Forecast: Predicted future growth is just above average when compared to all other trends.

Sectors: Current usage is similar across industry sector, company size and geographic region – future growth is less likely to come from AEC than other sectors.

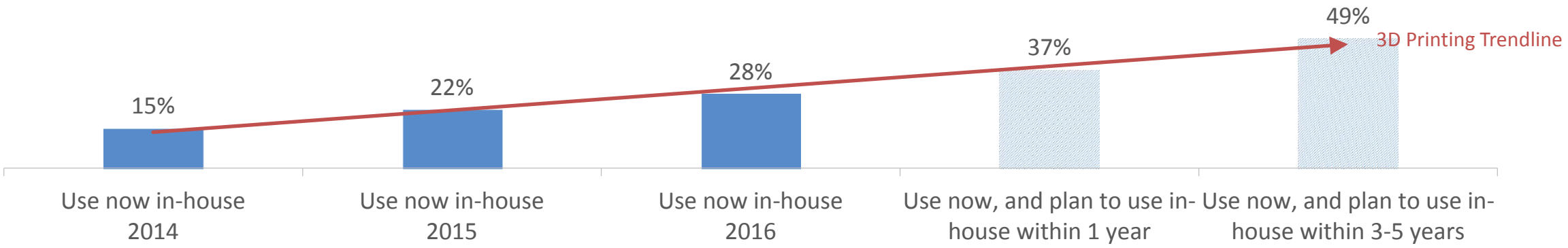
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 252)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 6th/15
Importance Ranking = 12th/15

3D Printing

2016 IMPORTANCE MEAN SCORE 4.5
2016 USAGE 28%

Good current usage, lower importance and just below average future potential



KEY FACTS

Observation: Usage has increased significantly, but importance remains below average, indicating a growing niche for 3D printing in today's market.

Forecast: Predicted future growth potential is average across trends, perhaps due to its niche position.

Sectors: Significantly lower usage in AEC (10%) than all other industry sectors – also lower usage in small companies (19%) than medium (31%) or large (32%).

Current Use: Limited brand recognition with half (49%) unable to name the brand they use. 1 in 4 (25%) use Stratasys, and 1 in 6 (16%) use Makerbot (slightly higher usage than in 2015).

Benefits: Benefits of 3D printing seen as design improvements (59%), savings on design time (51%) and faster response time to market (43%) , as well as cost savings (30%). *(based on those using or planning to use 3D printing – 311)*

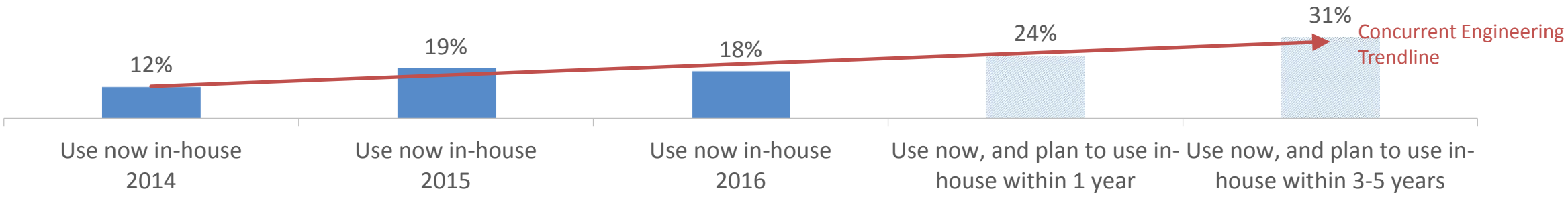
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 483)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 7th/15
Importance Ranking = 6th/15

Concurrent Engineering

2016 IMPORTANCE MEAN SCORE 6.3
2016 USAGE 18%

Relatively low current usage but above average importance, and average growth potential



KEY FACTS

Observation: Concurrent Engineering continues to be an area of interest in today's market, with above average importance, although usage is still relatively low.

Forecast: Importance and usage are both likely to increase with an average predicted future growth (across both 12 months and 3-5 years).

Sectors: Usage is similar across regions and industry sectors. There is currently higher usage in medium (17%) and large (28%) companies than in small companies (9%) – and long term future predicted usage is also higher in the larger companies.

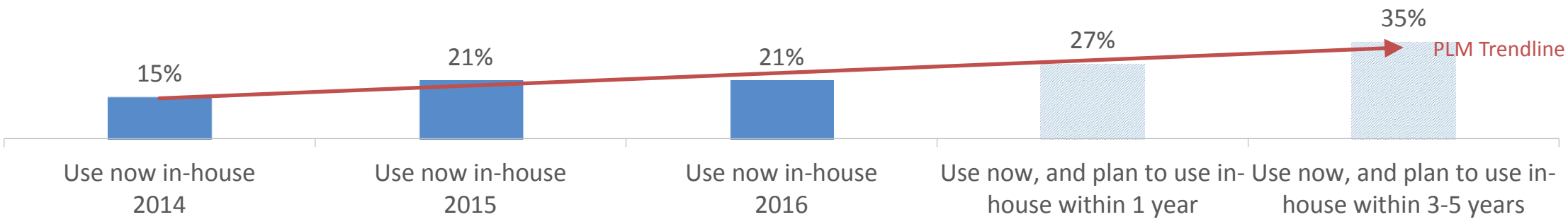
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 273)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 8th/15
Importance Ranking = 5th/15

Product Lifecycle Management (PLM)

2016 IMPORTANCE MEAN SCORE 6.3
2016 USAGE 19%

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 and usage only just below average.

Forecast: Usage has not grown from 2015 to 2016 as predicted, however there are still indications of potential growth on average across the trends measured.

Sectors: Significantly lower current usage in small companies (10%) than medium (16%) or large companies (39%). Also lower usage in AEC (8%) than Manufacturing (33%), and in APAC (13%) than the Americas (26%) – although short term growth more likely to come from APAC or the Americas than EMEA.

Benefits: Siemens Teamcenter (25%) and PTC Windchill (20%) continue to be the main products used. Perceived benefits are savings on design time (43%), design improvements (38%), cost savings (30%) and faster time to market (28%). Opinion is polarised as to whether graphics intensive work from the PLM is user friendly for those without an engineering background. *(based on those using or planning to use PLM – 202)*

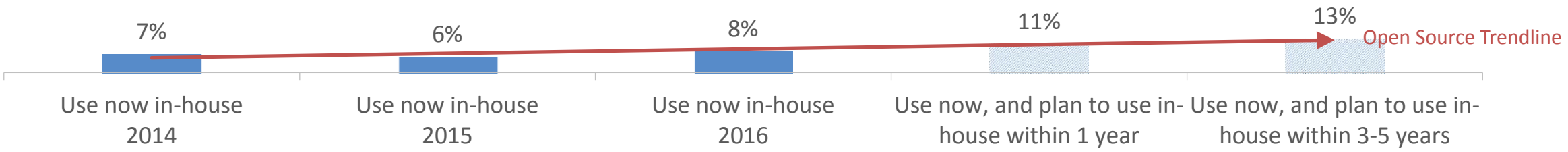
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 317)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = 9th/15
Importance Ranking = 13th/15

Open Source CAD Software

2016 IMPORTANCE MEAN SCORE 4.0
2016 USAGE 8%

Low current usage & importance, but some future potential



KEY FACTS

Observation: Very niche area in today's market, with below average importance and usage, although predicted growth in usage was achieved from 2015 to 2016.

Forecast: Predicted future growth potential is average, although from a low base level.

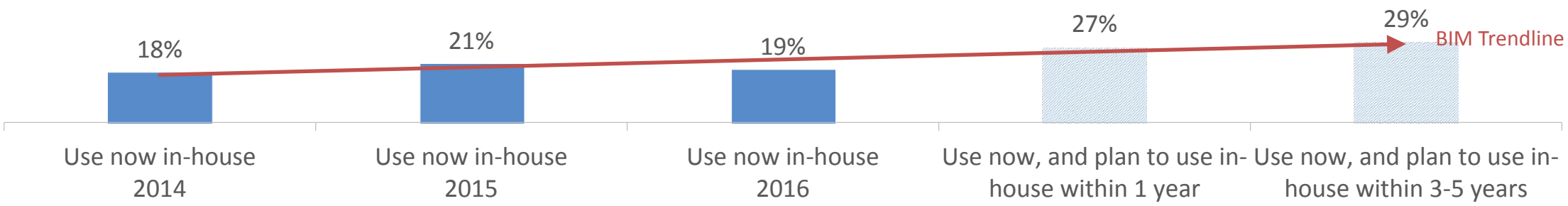
Sectors: Low usage is evident across all industry sectors (although slightly higher in the Utilities sector), company sizes and regions. There is also no particular standout area for predicted future growth to give focus for software providers.

Growth Potential Ranking = 10th/15
Importance Ranking = 7th=/15

Building Information Modelling (BIM)

2016 IMPORTANCE MEAN SCORE 5.7
2016 USAGE 19%

Good current usage & importance, but more limited future potential



KEY FACTS

Observation: BIM is an area in flux in today's market, with a dip in current usage for 2016, and a drop in perceived importance. Predicted growth has not been met year on year.

Forecast: Predicted future growth is below average – some way to go to make inroads in today's market.

Sectors: As expected significantly higher usage in AEC (38%) than manufacturing (5%) or other (11%) industry sectors.

Benefits: Benefits of using BIM are seen as design improvement (62%), savings on design time (47%) and cost savings (40%), as well as faster response times to market (35%) *(based on those using or planning to use BIM – 153).*

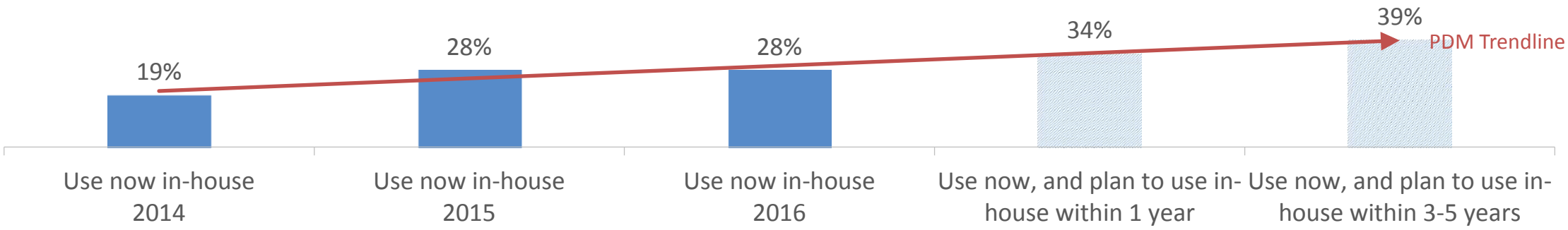
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 262)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = **11th/15**
Importance Ranking = **3rd/15**

Product Data Management (PDM)

2016 IMPORTANCE MEAN SCORE 6.9
2016 USAGE 28%

Average current usage & high importance, limited future potential



KEY FACTS

Observation: PDM is an important area in today's market, with around average usage.

Forecast: Although the predicted increase in usage from 2015 to 2016 was not met, there is still some future predicted growth potential in both the short and longer term, although this is below average when compared to other trends.

Sectors: Significantly higher usage in the Americas (36%) than EMEA (24%) or APAC (20%). As expected, significantly lower current usage in AEC (15%) than any other industry sector. Also higher current usage in large (37%) and medium (30%) companies compared to small (16%) companies .

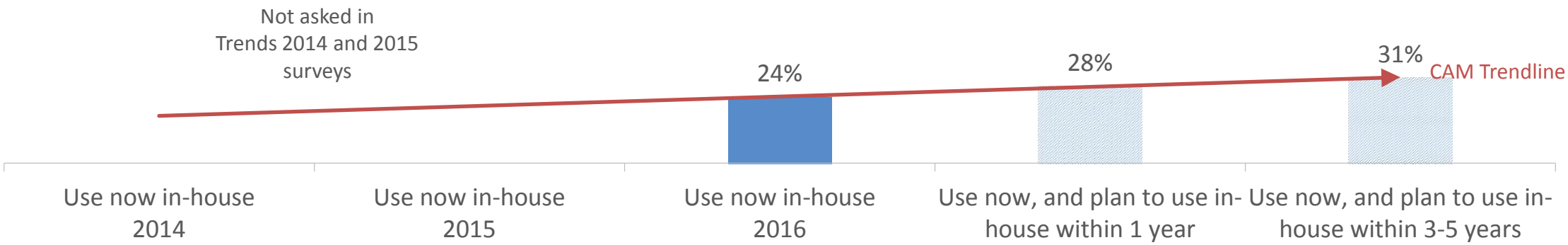
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 310)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = **12th/15**
Importance Ranking = **7th=/15**

CAM

2016 IMPORTANCE MEAN SCORE 5.7
2016 USAGE 24%

Good current usage, average importance, but limited future potential



KEY FACTS

Observation: CAM is of average importance in today's market, and has around average current usage

Forecast: Future predicted growth potential is relatively low – however 4 in 10 companies (41%) have seen an increase in usage of CAM in the past year (just 3% see a decrease) and a similar proportion have unchanged usage, indicating there is still potential to maintain and upsell to current users

Sectors: As expected, significantly higher usage in Manufacturing (34%) than AEC (9%). Also significantly lower usage in smaller companies (19%) than in medium companies (28%).

Current Use: MasterCAM (21%), NX CAM (17%) and SolidCAM (10%) are the most used CAM products. 7 in 10 (69%) feel CAM instructions automatically generated from 3D CAD to be important to their business – and 85% feel that the same or more effort should be put into improving CAD to CAM integration by CAD software suppliers. *(based on those using or planning to use CAM – 202)*

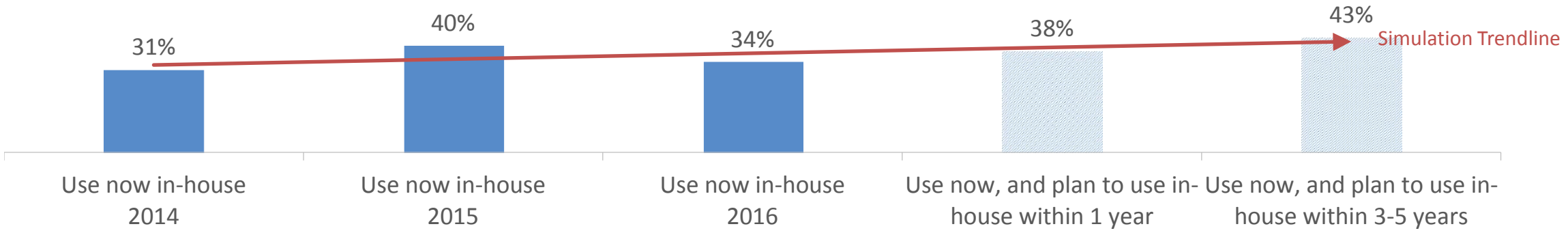
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 355)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = **13th/15**
Importance Ranking = **4th/15**

Simulation / CAE

2016 IMPORTANCE MEAN SCORE 6.8
2016 USAGE 34%

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



KEY FACTS

Observation: Simulation saw a dip in stated usage from 2015 to 2016, although this is still higher than average – and is still seen as an important area in today's market

Forecast: Despite the decline in usage in 2016, there is seen to be some potential for future growth, although at lower levels than some other trends.

Sectors: More likely to be used currently in large companies (45%) than small (28%) or medium (30%) companies. As expected, significantly lower current usage in AEC (15%) than any other industry sector.

Current Use: Usage of Simulation is seen mostly for design optimisation (79%), design validation (73%) or prediction of product performance (67%) *(based on those using or planning to use simulation – 270)*

Drivers: Ease of use for less experienced designers would be a key driver in encouraging additional use of simulation software (46%) or a 50% cost reduction (34%). Some level of expert support for usage guidance is generally expected as part of the package (39% all support free, 28% some support free).

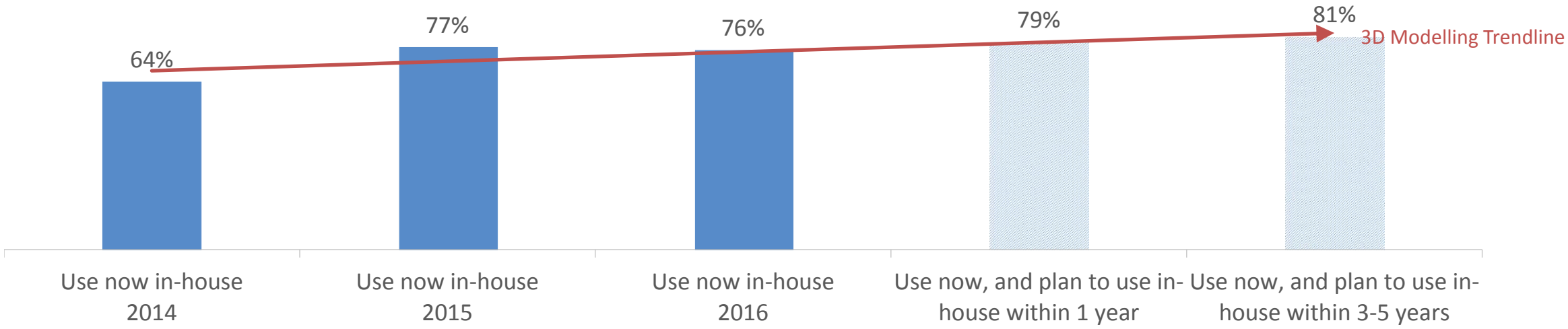
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 342)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = **14th/15**
Importance Ranking = **1st/15**

3D Modelling

2016 IMPORTANCE MEAN SCORE 8.4
2016 USAGE 76%

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



KEY FACTS

Observation: 3D Modelling is a core and slow growth area in today's market, with high importance and usage – usage stabilises after significant uplift 2014 - 15.

Forecast: Future predicted growth potential is limited across all 3 regions.

Sectors: High current usage in manufacturing (81%) and other (85%) sectors – significantly lower in AEC (65%). Significantly lower current usage in APAC (60%) than in EMEA (79%) or the Americas (80%) (but no additional propensity to grow).
Large companies are more likely to be current users (85%), although 7 in 10 use in small (70%) and medium companies (73%).

Business Advantage
intelligence insight innovation

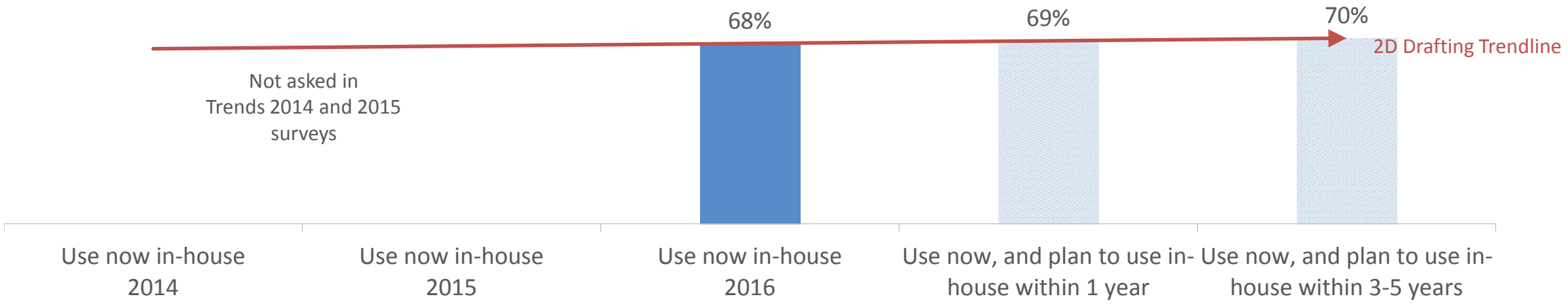
Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 525)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

Growth Potential Ranking = **15th/15**
Importance Ranking = **2nd/15**

2D Drafting

2016 IMPORTANCE MEAN SCORE 8.1
2016 USAGE 68%

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



KEY FACTS

Observation: 2D Drafting, as 3D Modelling, is a core and slow growth area in today's market, with high importance and usage.

Forecast: Very limited future predicted growth potential – in part due to high current usage, but also due to shift to 3D work (2D work likely to be stable (52%) or decreasing (26%)).

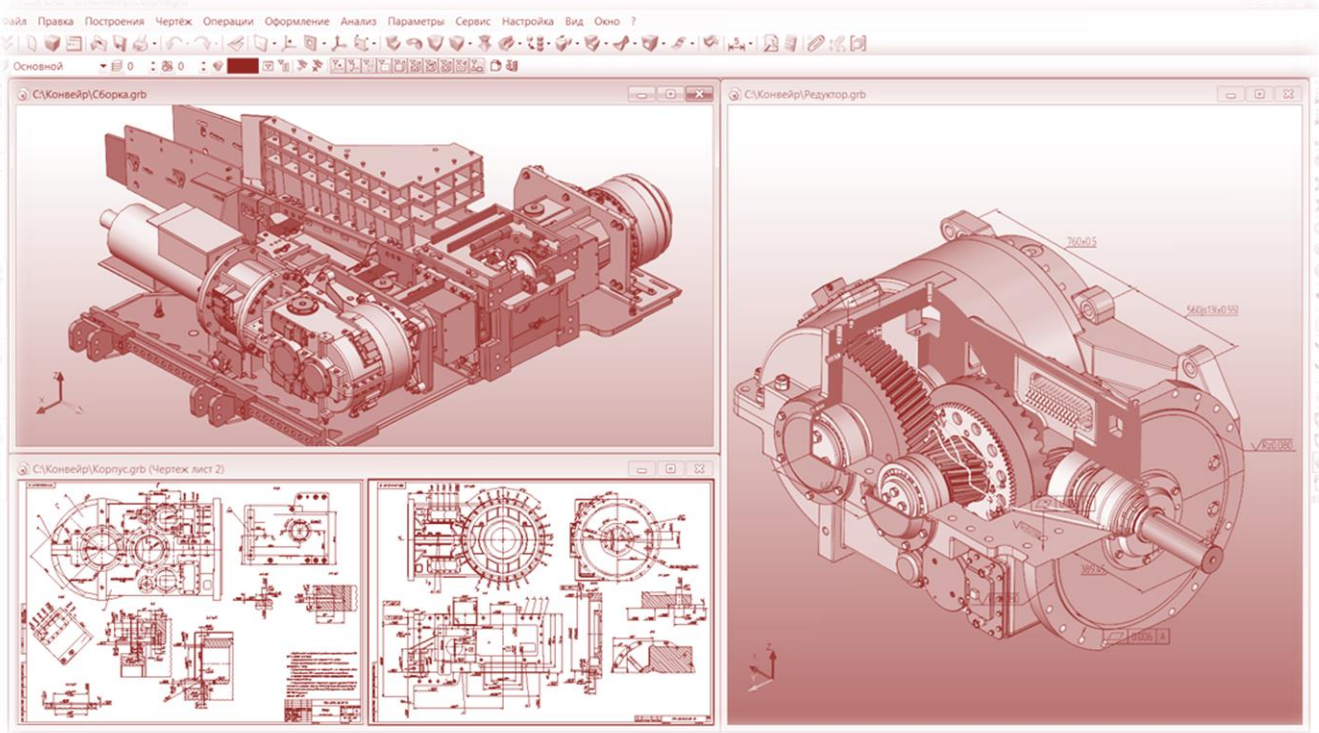
Sectors: Generally similar levels of current usage across industry sectors. Significantly lower current usage in APAC (42%) than EMEA (71%) or the Americas (77%).

Current Use: On average 39% of design work produces 2D drawings, 34% both 2D and 3D and 27% 3D. Three-quarters (77%) feel 2D drawings automatically generated from 3D CAD or BIM to be important to their business – and a similar proportion feel that the same or more effort should be put into improving 2D drafting capabilities by CAD software suppliers. (*Based on those using or planning to use 2D drafting – 420)*, Thus demonstrating the continuing importance of 2D in a 3D CAD world.

Base: Importance score is based on all aware of this particular CAD Trend in 2016 (2016 – 454)
Base: Usage score is based on everybody (All: 2014 – 409, 2015 – 635, 2016 – 610)

CAD Usage

Section Two



Most used CAD Software Packages

10 most used packages	Trends 2016	*Used significantly more by….*
1	AutoCAD	*AEC, medium companies*
2	SolidWorks	*Manufacturing, other industry sectors*
3	Inventor	*Manufacturing, other industry sectors*
4	AutoCAD LT	*AEC*
5	PTC Creo	*Manufacturing, other industry sectors*
6	CATIA	*Manufacturing, large companies*
7	NX	
8	AutoCAD Mechanical	*Large companies*
9	9=MicroStation	
10	9=Revit Architecture	

Most used Collaboration Software Tools

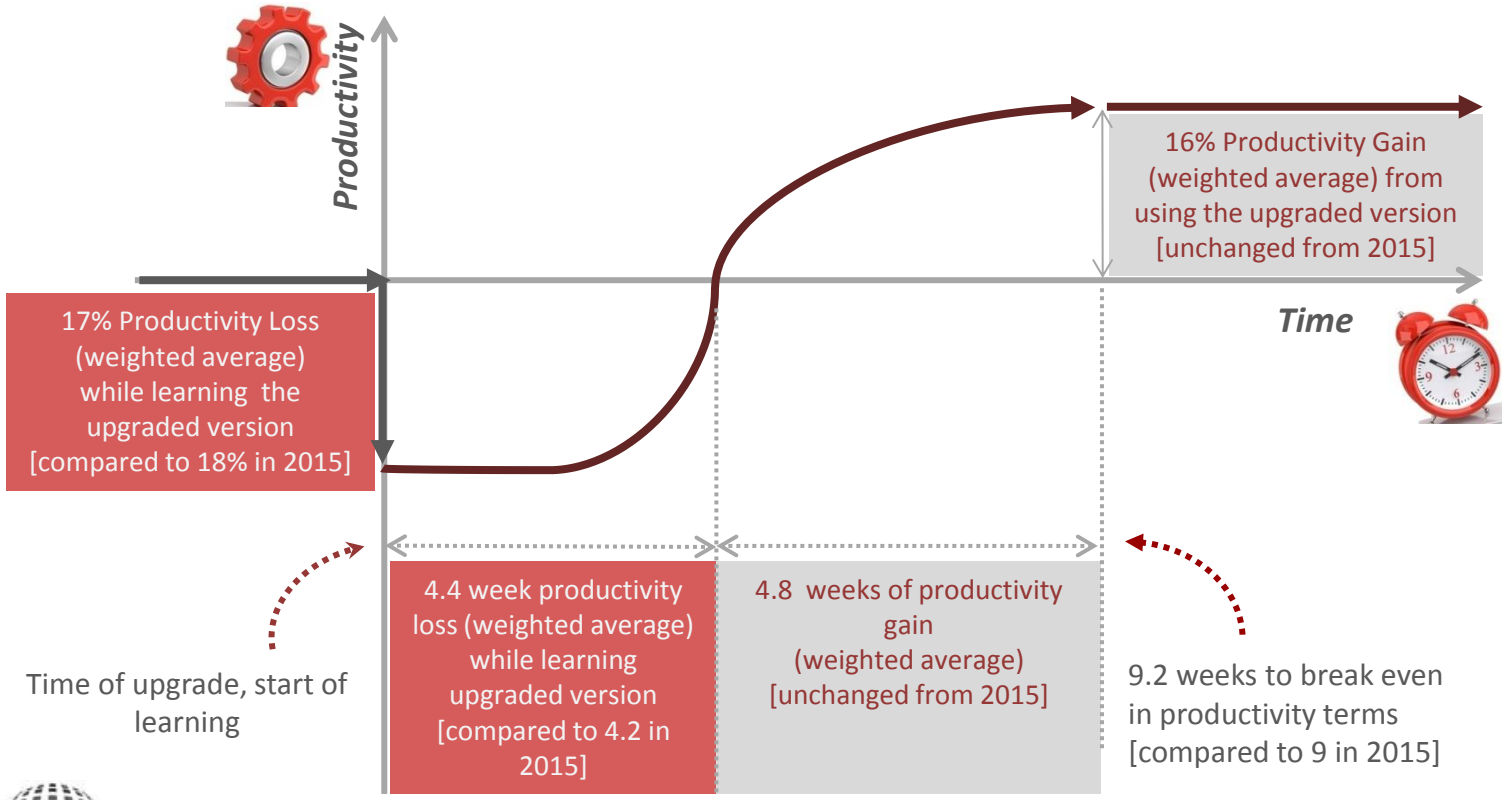
10 most used packages	Trends 2016	*Used significantly more by….*	*Trends 2015 ranking*	Y-on-y change
1	Autodesk Design Review		*1=PTC Windchill*	▼
2	2=Autodesk Vault		*1=Autodesk Design Review*	=
3	2=Autodesk Navisworks	*AEC*	*1=Siemens Teamcenter*	▼
4	4=PTC Windchill		*Autodesk Navisworks*	▲
5	4=Autodesk A360	*AEC*	*5=Autodesk Vault*	▲
6	Siemens Teamcenter	*Manufacturing*	*5=Bentley ProjectWise*	▼
7	Autodesk Buzzsaw		*7=SolidWorks Enterprise PDM*	▲
8	8=SolidWorks Enterprise PDM		*7=Autodesk Buzzsaw*	=
9	8=Bentley ProjectWise		*9=Bentley ProjectWise WebServer/Explorer*	▲
10	SolidWorks Workgroup PDM		*9=Solidworks Workgroup PDM*	▼

41% state they do not use collaboration software – particularly in AEC (48%)

Q: Which (if any) software solution(s) do you/your company use for collaboration, data and information management?
(Base: All – 610)

Value in Software Upgrades

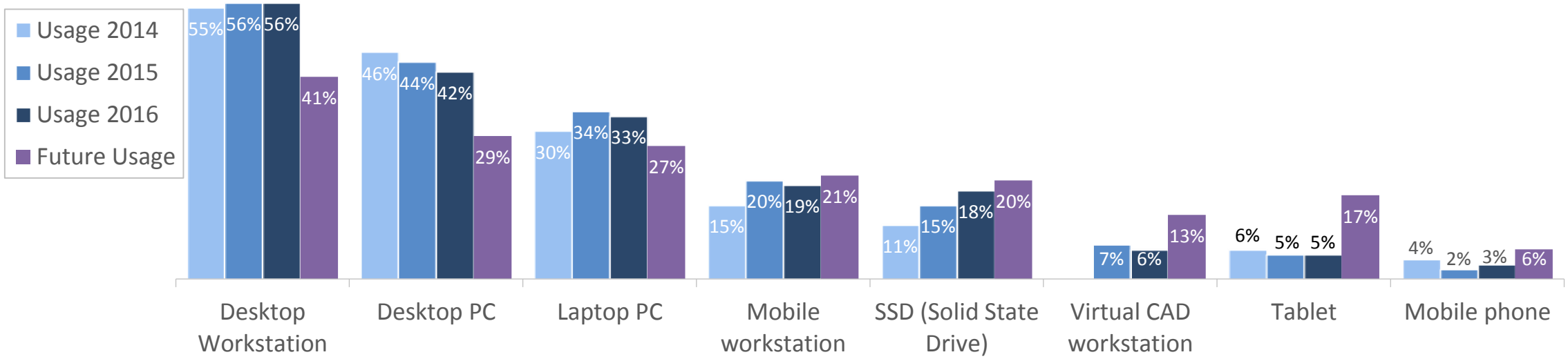
Just over half of those surveyed had upgraded, changed or added to their CAD software in the last 12 months, so were asked a series of questions around productivity during transition



- The results show that on average CAD upgrades break even (in productivity terms) in just over 2 months (an improvement since 2014, stable since 2015) 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: Current usage for desktop based solutions is stable, predicted significant decline in future demand. Interest in mobile phone usage remains relatively low

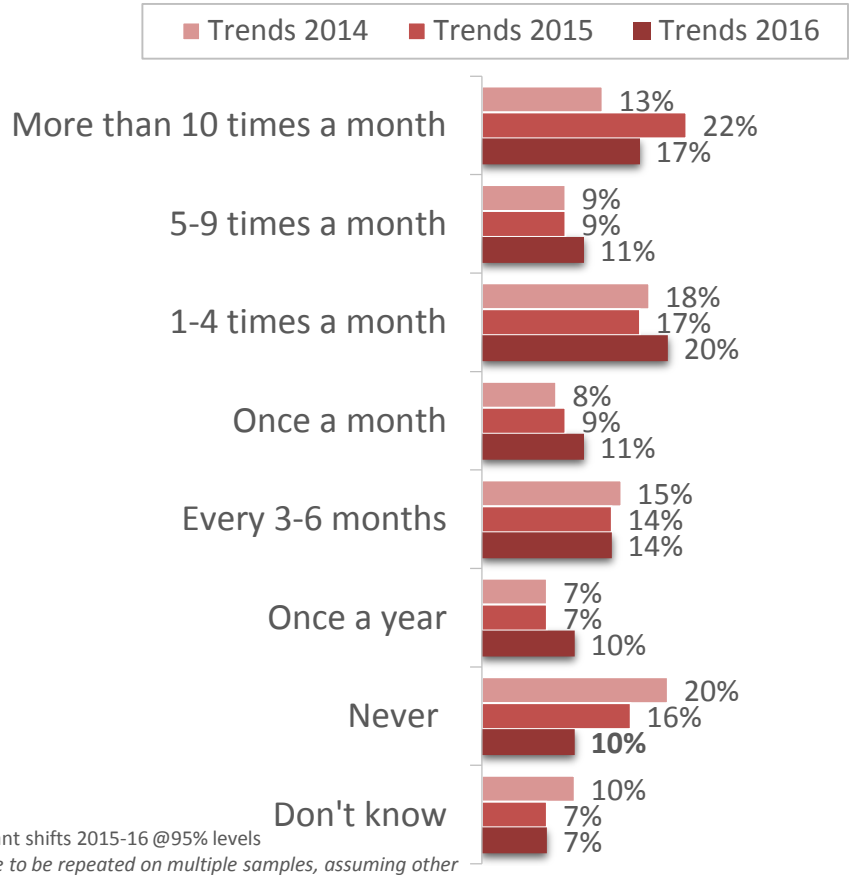
Forecast: Increase in the usage and demand for mobile (tablet & mobile phone) and virtual solutions

Business Advantage
intelligence insight innovation

Q. What type of hardware do you use for CAD systems at the moment? (Base: All: 2014 – 409, 2015 – 635, 2016 – 610)
Q. What type(s) of hardware do you think you will use more often for CAD systems in the future? (Base: All: 2016 – 610)

Frequency of Downloading 3D Models

TREND 2016 AND Y-ON-Y COMPARISON

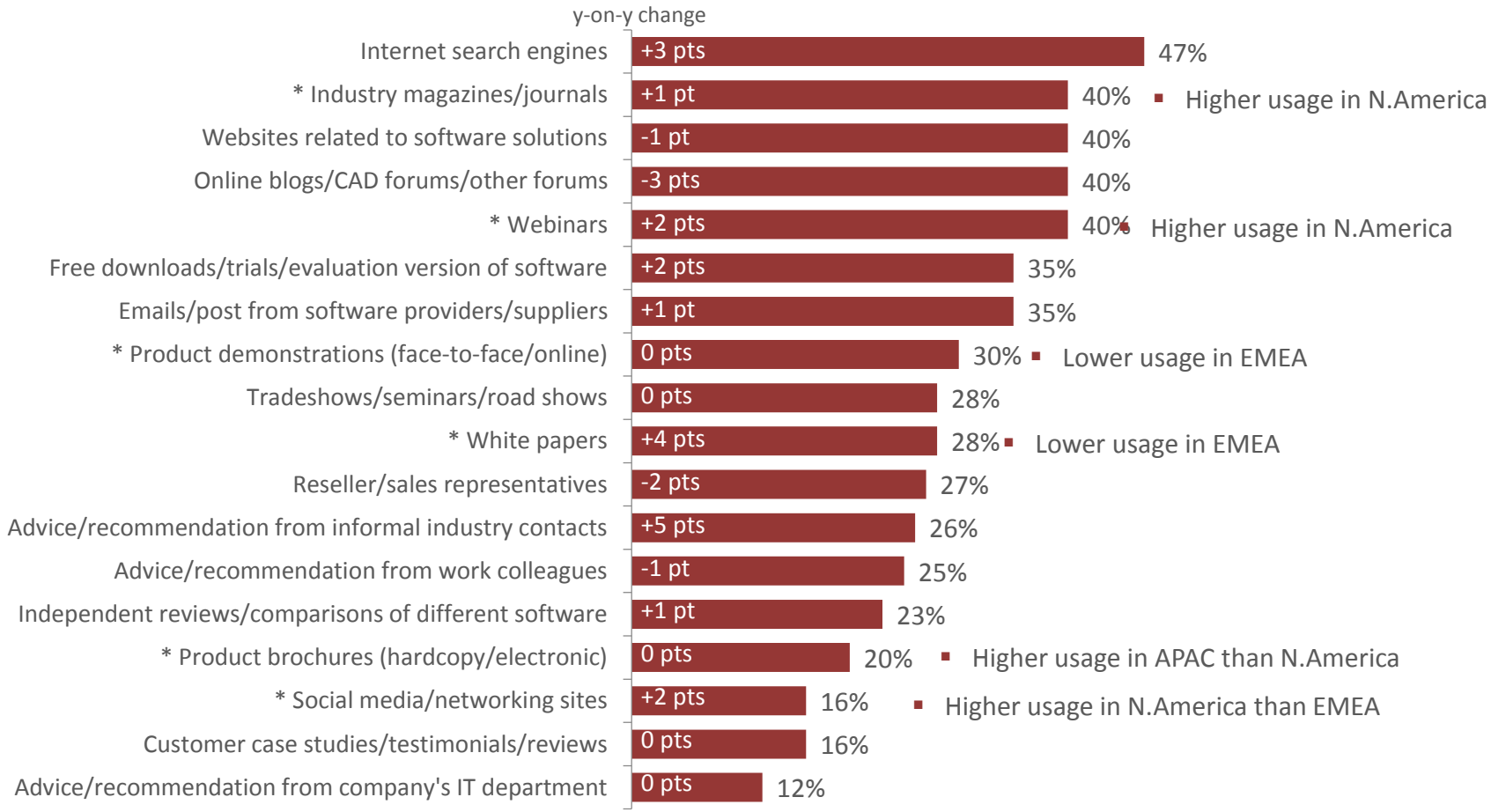


Bold font - Significant shifts 2015-16 @95% levels

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

- Significant decline in those never downloading to 1 in 10
- Overall increase in the number of users downloading 3D Models monthly (although dip in very frequent usage)

Popular Sources of Information on CAD Software



** Shows significant difference between regions @95% levels*

KEY FACTS

- Overall, usage of information sources has remained stable from 2015, after increases in 2014
- These are consolidated results for all job titles – but favoured media differs considerably by job title, therefore marketing to reach senior managers, CAD managers or engineers should use different strategies
- Similarly, different preferences are seen within industry sector, again requiring different approaches

Business Advantage
intelligence insight innovation

Q. Which source(s) of information do you use to keep up to date with regards to latest developments in the CAD industry?
(Base: All: 2015 – 635, 2016 – 610)

Contact: The Business Advantage Group

International B2B Research Specialist (CAD/CAM/CAE/PDM/PLM Sectors)
Please get in touch with us for further information or customised reporting

Key Contacts

Nicola Mansfield, Market Analysis Director (Nicola.Mansfield@Business-Advantage.com)

Bill Gordon, VP Business Development (Bill.Gordon@Business-Advantage.com)

Chris Turner, CEO/Managing Director (Chris.Turner@Business-Advantage.com)

Social

linkedin.com/company/business-advantage

twitter.com/BusAdvantage

Phone

UK: +44 (0) 1689 873636

USA: +1 (650) 558 8870