Autodesk (ADSK) $131

- Autodesk is a changed company, with better long term growth drivers and pricing power than the market appreciates.
- Technology disruption is finally coming to the construction industry, giving ADSK a solid tailwind.
- Operating leverage has been hidden due to shift to subscription. FY19 is the inflection year.

July 3, 2018

Potential Upside: $184 (+40%): DCF based, fully expensing SBC. Estimate $2bn in FCF in 2022.
Sensible Downside: $107 (-18%): Estimate $1.5bn in FCF in 2022

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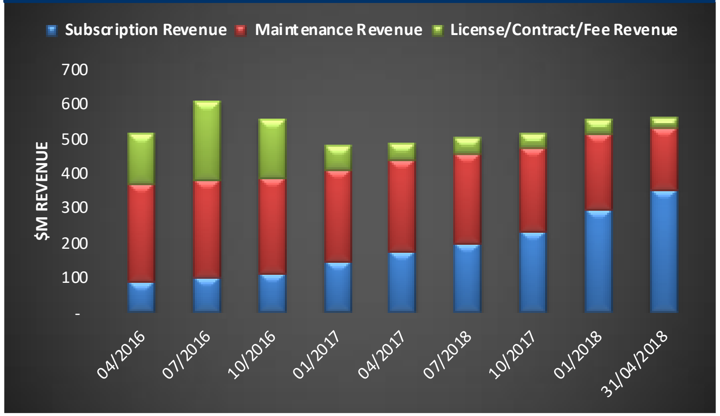
Description

- Autodesk is global leader in design software and services. Products enable customers to design, fabricate, manufacture and build products.
- **Autodesk is a company undergoing a radical change.**
  - **Change 1: shift to a subscription model**
  - **Change 2: shift from desktop to multi modal software enabled by the cloud.**
- The cloud is enabling new products and collaborative workflow improvements both in manufacturing and building construction.
- **Autodesk is in the process of establishing itself as a platform company**. Peers (Dassault, Siemens, Nemetscheck, PTC etc) are taking a different approach, yet all wish to become platforms.
- **Customers are asking for solutions, not point products.**
  - ADSK is solving the complexity of the system problem.
  - The system is changing in both manufacturing and AEC. Both processes need modernising, and **a centralised database is key to solving the inefficiency problems**.

End Markets as % of FY2018 Revenues	
AEC (Architecture, Engineering, Construction)	42%
Manufacturing	29%
AutoCAD & AutoCAD LT	19%
Media and Entertainment	7%
Other	2%

Geographic Revenue Split	
Americas	42%
EMEA	40%
APAC	18%

Mix shift to subscription business



Glossary of frequent terms:
ARR = Annualised Recurring Revenue
ARPS = Average Revenue Per Subscription
AEC = Architecture, Engineering, Construction

What is the market missing?

The market clearly understands the transition to a subscription model, so why spend time on ADSK?

We think the long term growth and pricing power is undervalued.

- **BIM is at an inflection point due to better collaboration workflow** enabled by cloud
  - Although the automation of the construction industry trend has been around for at least a decade, the adoption of technology is now inflecting. Longevity of this growth opportunity is underappreciated by the market.
- **Autodesk has potential beyond the model transition**
  - The benefits of subscription model driving increased innovation and platformisation.
  - We believe a fully transitioned ADSK subscription model will fare much better in a downturn than prior cycles.

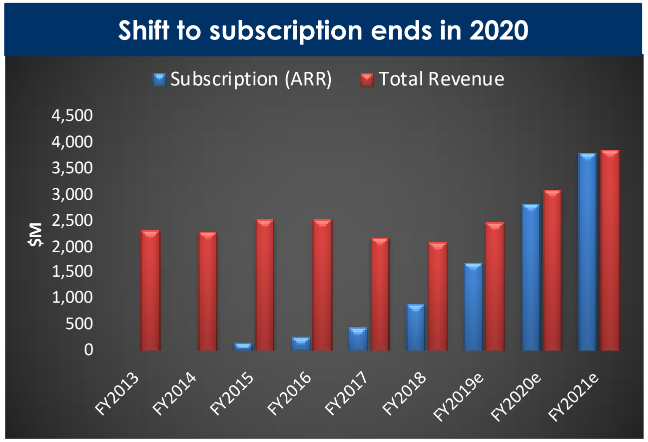
- **What to watch:**
  - **Increasing confidence in FY 2023 FCF will be driven by more proof points on ARPS growth, from todays heavily discounted service, and subscription growth post FY 2019.**
  - We also believe increasing adoption of BIM in the industry will make investors take notice of this major trend.

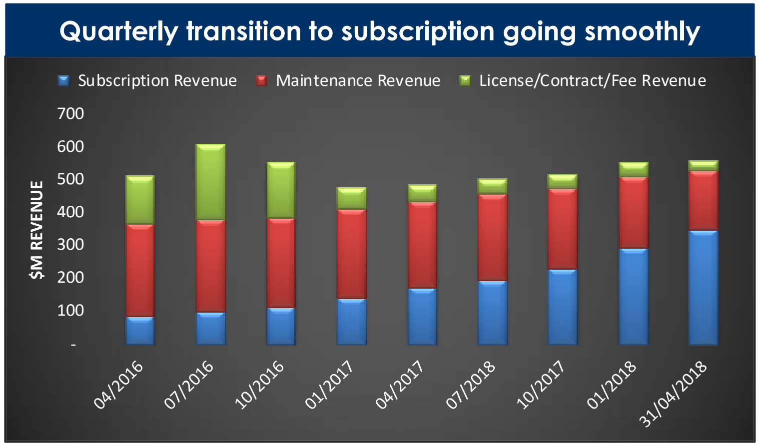
Thesis: in a nutshell

- **Building Information Management (BIM) is the key trend.** It is Lean / continuous improvement for the construction industry.
  - BIM is difficult to define precisely, at its core it is using/sharing data to automate workflow in the AEC industry.
  - There are different shades of BIM. Similar to autonomous driving, you have to reach level 1 before you can reach level 2 and so on.
  - **BIM is at an inflection point due to better collaboration workflow**
- **ADSK used to sell point products, but it is moving to become a platform.**
  - If it becomes a platform 2019 FCF is not what it should be valued on.
- **Volume growth and pricing power**
  - **Heavy discounting normalises over the next 3 years pricing/ARPS growth is very strong.**
  - Longer term ADSK subscriber growth is ~12%, plus mix/pricing which adds 5%+ to ARPS.
- **Fixed Cost leverage**
  - Near term the company is adamant that operating costs will remain flat.
  - Longer term, ADSKs ability to see expanding margins is a key point of debate.

The basics

- **ADSK's transition to a subscription model is expected to be completed by FY2020. (Jan 2020 yr end)**
  - ARR is annualised recurring revenue, and the most important metric for Autodesk.





- **Post transition growth rate determined by**
  1. **Subscriber growth**
     - **A. Core subscription growth**
       - Single products, suites and collections. Autodesk pushing towards a simplified model.
       - Enterprise subscriptions (EBAs): Approx. half of these include cloud as part of the bundle
     - **B. Cloud Subscription growth:**
       - BIM 360 platform that covers the construction industry
       - Fusion 360 platform that covers the manufacturing industry
  2. **Average revenue per subscriber (ARPS) growth.**
     - Driven by mix, both in sales channel, and product.
     - Cloud is priced at ~$200, Core a an average of ~$700

Subscription model is a game changer

- The subscription model drives growth:
  - **We believe that software companies moving to subscription model breaks down barriers to entry and dramatically expands the market.**
  - We have seen this in Microsoft, Adobe and Intuit's QuickBooks.
  - Historically, Autodesk licenses cost $4,000 to $11,000 upfront. It was also very complex to manage licenses.
  - A $300 to $2600 per year subscription or in the future potentially per hour use opens up the market substantially.
- **For Autodesk the subscription model may have a profound effect.**
  - **Subscription model removes barriers of different versions** from various years bringing all users to the most current version
    - Previously: A client required you to use a specific software version, e.g. request for Revit 2010 or AutoCAD MEP 2012, to integrate with them. Subscription model renders this irrelevant.
    - **Today: If a client is going to put the CAD/BIM requirement in, it will force an upgrade** to subscription for the laggards. Same price, so not a cost discussion.
  - **Finally gets all Autodesk customers onto the same software, enables all modern capabilities.**
    - For customers who remain on the old systems it gets harder and harder for them to trade files as time progresses.
- **Collaboration is a strategic asset, and barrier to entry. Basic file sharing is a key consideration.**
  - Managing file sharing, version, vault history, access etc are critical tasks.
  - Ensures old perpetual license products become obsolete quickly increasing attraction of subscription
- **Industry growth:**
  - **BIM market is growing at 20%-30% pa**
  - **CAD market is expanding at 6-8%pa because of the 2D to 3D shift.**
  - The entire industry has pricing power.

Collaboration is critical in construction

- **The key change happening in the workflow is <u>how</u> collaboration is happening.**
  - Often, the reason for delays and cost overruns in construction industry can be traced to inefficient communication between owners, architects, structural engineers and the site managers.
- Taking a leaf from the lean handbook, **collaboration can only happen in complex supply chains if all participants are digital** (occurred over the last 20 yrs) **and have the ability to exchange and integrate data easily.**
  - It is the data exchange that is changing collaboration.
  - Increasing data exchange mandates that users have more standardised software that can integrate easily with each other.
- **Collaboration is driving the platformisation of the manufacturing and construction design/build workflow.**
  - This is why we are so positive on the longer term trend.
  - Swapping files and coordinating progress is much more straightforward with a dedicated project collaboration tool.
- **Why is it happening now?**
  - Tools available, cloud and connectivity maturing.
  - Forcing factors from owners of capital. E.g. some governments are making it mandatory for building projects.
    - Contractors:
      - Tier 1: BIM serves their needs, makes them more efficient.
      - Tier 2 : Being forced to adapt to BIM processes, which is often a challenge due to lack of technical education.
- **Autodesk's BIM 360 and Fusion 360 have a reasonable chance of becoming the platforms of the future for collaboration**

Autodesk is poised for revenue growth

- ADSK's revenues have declined over the last three years due to the transition in the model
  - The transition is well understood
- **FY19 is the inflection year** as the proportion of maintenance and license has become a small proportion of the revenues. (FY 2019 has a Jan 2019 year end)
  - From FY20, subscription revenue will be almost all of the annual revenue for ADSK
- **ADSK expects 20%pa revenue growth over the five years FY18-23 driven by:**
  - **Number of subscriptions**. Increase from current 4.2m to 7m (11% CAGR, page 10)
  - **Average revenue per subscription (ARPS):** 9% CAGR in ARPS from $518/subscription in FY18 to $814/subscription in FY23.

4 Years of Revenue Stagnation ends in 2020

Revenue growth of ~20% after the shift to subscription?

Autodesk is a core holding

- **Technology adoption in the construction industry is leading to an acceleration of revenue growth as software and automation captures more of the construction value chain.**
  - Adoption is driven by:
    - **Collaboration, removing friction from the system** to overcome the common delays and cost overruns. BIM systems are the solution.
    - **Move from licenses to subscription and consumption model** is breaking barriers for new users and fostering innovation.
    - **Adoption of the cloud in workflow** is the main enabler of better sharing and mobility
- **Autodesk is creating a platform for sharing across the construction industry**
  - Autodesk has been brave in the **creative destruction of its business across numerous facets.**
  - The **subscription model shift, moving channel sales to direct sales, individual products to solutions and pushing Enterprises towards a consumption model.**
  - Given the successful transition (so far) to subscription model, we believe **ADSK has the potential to become a platform of choice for BIM**
- Autodesk's quality is also vastly improved with move to subscription model.
  - less volatile revenue and also the opportunity to increase services and value to customers
- **Revenue growth and operating margins are inflecting**
  - Operating margins are inflecting this year.
  - **We believe the company targets of $5.6bn in revenue and operating margins of ~47% in FY 2023 (Jan yr end) can be exceeded.** (N.B: 47% is adjusted for SBC)

- **We think ADSK is a core holding, where the long term ability to grow at high incremental margins is mispriced.**

Autodesk Growth

Growth summary

- **ADSK's transition to a subscription model is expected to be completed by FY2020. (Jan 2020 yr end)**

- **Post transition growth rate determined by**
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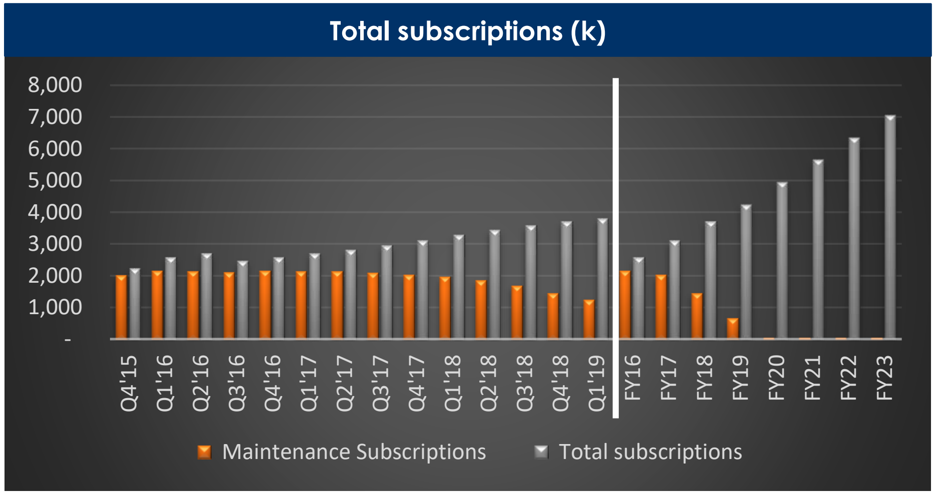
Net new subscriptions

- While ADSK transitioned from a license & maintenance model to subscriptions over the last 3 years, net **new subscribers remained strong at the historic average of 500-600k per year**
  - This ties in with average license additions over the last 10 years.

	FY16	FY17	FY18	FY19	FY20	FY21
Plan Subscriptions	207	660	1,180	1,325	1,200	700
Maintenance Subscriptions	138	(133)	(569)	(800)	(600)	No Change
New subscription additions	345	527	611	525	600	700

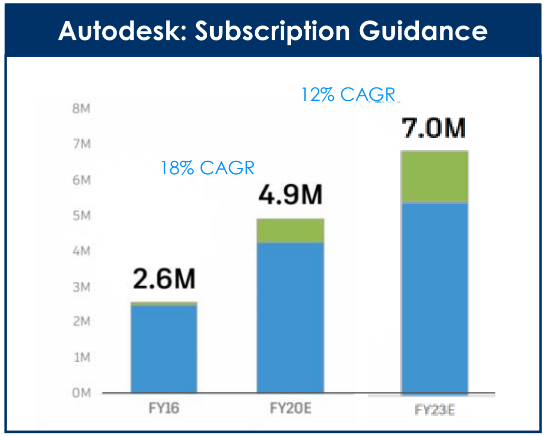
- Given that ADSK is ~10% penetrated of the TAM and the increasing digitization, we believe it is too early for maturity of core new subscriptions.
  - Core products TAM in FY20 is expected to be $12bn and BIM likely to add another $10bn.
  - **Underlying core market growth is ~6-8%**

- Estimate ADSK will add ~700k new subscriptions per year.
  - We expect underlying **core subscriptions increases are likely to remain ~400-500k a year.**
  - **PLUS an additional 200-300k per year from "cloud",** due to the increasing opportunity in cloud and construction especially BIM 360 over the next five years.



Autodesk targeting 7m subscriptions

- **ADSK's targeting a 12% CAGR in subscriptions**
  - The number of subscriptions increases from 4.2m in January 2019 to 4.9 million in FY2020 (Jan year end) to 7.0 million in FY 2023.
  - **Autodesk has had some problems communicating with investors. Subscriptions and subscribers are not the same.**



- **Cloud subscriptions**
  - Guided to go from ~14% of 4.9m (700k) in FY20 to ~22% of 7.0m (1.5m) over three years.
  - **i.e. an addition of 800k subscribers, or ~270k/year.**
  - **Key product: BIM 360**
    - We forecast a ramp-up of BIM 360 subscribers from the current ~200k to ~1.0m over the next five years.
    - We think will turn out to be conservative given our bullish view on changes in construction industry and BIM adoption
  - Fusion 360 will likely ramp slower than BIM.
    - Estimate subscribers of ~150k today, rising to 500k in FY23.
    - Could accelerate after that

- **Core products subscriptions** including EBA (enterprise agreements) are guided to increase from 4.2m in FY2020 to 5.5m in FY23 (1.3m = ~430k/year).
  - **Core growth has positive drivers of ongoing digitization, market expansion because of move to subscription model and accelerated legacy and pirated conversions**

Conversion of non-paying active users

- **There is a large pool of ADSK users who are not paying maintenance but bought perpetual licenses.**
  - So far, they haven't felt the need to be using the most recent software.
  - **ADSK has been aggressively targeting this group for conversion to subscription.** ADSK has targeted this cohort with a discount that has been steadily decreasing.
    - It started this two-and-a-half years ago, the discount was 70% for up to a three-year product subscription.
    - The discount has moved from 70% to 50% to 30% to 25%, now it's 15%.
    - It has run the program in Q1 and Q3 over the last two years and in Q1'19. **In each instance, it's yielded between 24,000 and 28,000 subscription additions from this pool. I.e. 50-60k conversions per year.**

- ADSK should be able to consistently convert this pool of ~2 million users over the next few years.
  - **Of the 2m non-paying active users, a clearer target is the 0.8m that are using software that is more than five releases old.**
- ADSK estimates **besides the 2m active non-payers there are an additional 5.6m who are not active users.**
- We believe **ADSK could accelerate customer conversion from this pool in the future given the subscription model's lower upfront costs and increasing importance of integrated collaboration.**
  - Customers who don't need collaboration unlikely to feel pressure to change.
  - Cost of staying on current software is zero. These clients have already decided not to pay maintenance.

Enterprise Business Agreement(EBA)

- **EBAs have been a major success for ADSK**
  - Launched in 2016
  - **~45% of named accounts are on EBA as on January 2018 vs 25% in Dec 2016**
  - EBAs expected to make up ~$400-$500m in FY 2020 revenues.
  - Over the last 3 years (FY15-18) **EBA ARR (annualised recurring revenue) has grown by 55% pa**
  - Because of EBA, ADSK has seen 2.5 times increase in the usage of an enterprise
- **Under EBA, enterprises buy a pool of tokens, i.e. it is a consumption-based licensing mechanism.**
  - Subscriptions are three year contracts, therefore **FY 2018 was the first year with that first wave of customers came up for renewal.** On average **EBA's were increasing their deal value by about 40%.**
  - One-off for these customer as they were rightsizing their token requirements, but this shows the power of removing license cost as a barrier to use.
- **Cloud products have become an integral selling point for EBA customers,** usage within EBA customer base has taken off.
  - **In Q1'18, just over half of the monthly active users for BIM 360 were in EBA accounts**
- **Simplified licence structure**
  - Single agreement provides an Enterprise with flexible and global access to ~60 Autodesk products, including software titles not previously available across the many licenses they had.
  - The EBA also allowed an enterprise to consolidate all of the independent software licenses into a single license agreement reducing admin cost.
- **EBA subscription estimate:**
  - ADSK counts monthly active users (MAUs) over 90 days.
  - *"There is typically significant uptick at that first read and then there is some ongoing growth after that."*

Subscriber additions from reduced piracy?

- ADSK estimates there are **12m non-paying users worldwide** that are using pirated copies of ADSK products.
  - 4m of the 12m are in mature markets and likely to be easier targets.
  - **Out of the 4m there are ~20-25% known users.**
    - Over 1 million of the pirated users are sitting in accounts that are paying ADSK for a few copies but use many more copies that are pirated.
- This is an ongoing change and likely to be a tailwind of growth for many years. We think it **could accelerate because of the subscription model**.

- ADSK cannot go after these customers aggressively, due to the risk of upsetting paying customers. However, given the transfer to subscription and cloud services, over time serious users will be forced to pay, but it may take a very long time to convert the 1m users.

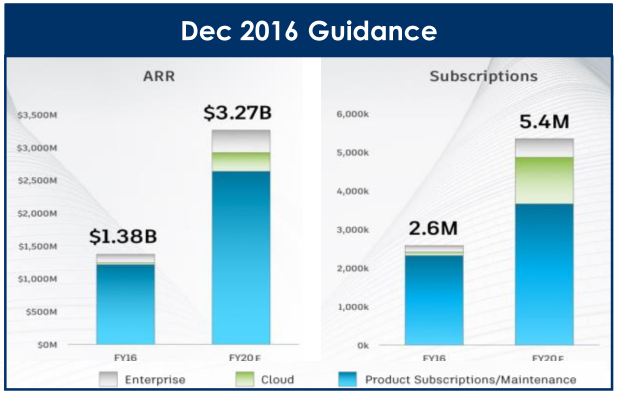
Cloud Growth

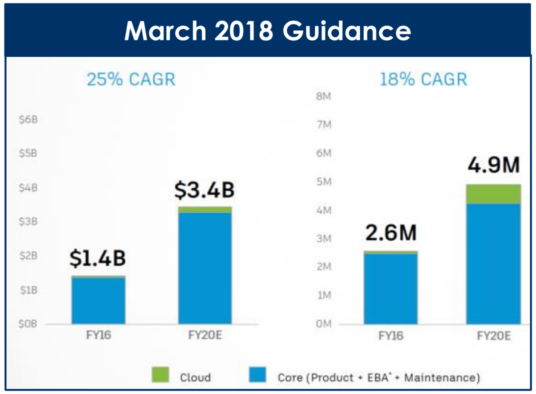
Cloud: What are ADSK's cloud services?

- **Cloud services for ADSK includes the three platforms launched in 2016.**
  - **BIM 360:** Everything ADSK does in AEC will be in BIM 360
  - **Fusion 360:** platform for product design and manufacturing
  - **Shotgun:** platform for media and entertainment
- Future technology developments will fold into one of these three platforms.
- Autodesk is also working on a creating a **developer platform called Forge.**
- **Cloud is the enabler of value added services:**
  - ADSK is utilizing the cloud to allow customers to collaborate much better.
  - The importance of file sharing in a controlled environment should not be understated. Large projects are hugely complex and have many teams and companies working on the same project.
  - Enabling more efficient collaboration is step one in successful BIM.
  - **Cloud also enables BIM models to be taken into the field and the construction/build industry, which is the high growth market of today.** Cloud brings the much needed collaboration plus mobility to make the workflow more efficient.
- **The cloud has the potential to radically alter workflows longer term.**
  - As soon as files are stored in the ADSK cloud, ADSK can use the cloud (AWS) to sell value added services.
    - E.g.to do rendering or fluid dynamics calculations on a design. I.e. ADSK is building the ability to have a much more direct and self-service interface with customers.
  - **Autodesk 360 Cloud Credits** perform certain tasks, such as creating a rendering or running a simulation in a cloud environment. $100 for 100 pack of credits.
    - Time savings: produce renderings in a fraction of the time it took before, going from hours to minutes for most rendering, frees up designers/engineers computers for project work.
    - This also enables **generative design. Multi simulation rather than pass/fail answers.** (Potential game changer for industry)

Cloud becoming significant driver of the business?

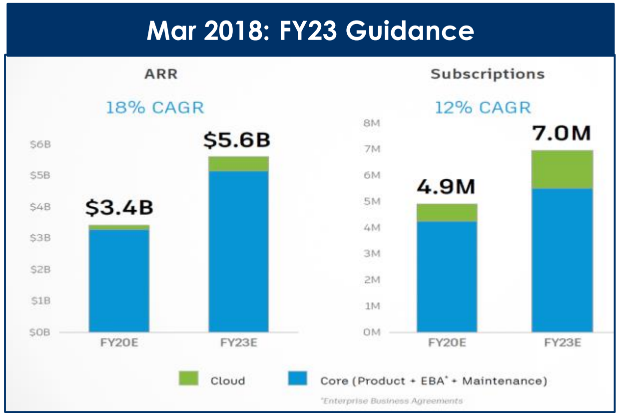
- Cloud products have had an explosive growth since the launch in 2016 and will become a significant contributor over the next 5 years.
  - ***"Our cloud products have become an integral selling point for our EBA customers, and usage within our EBA customer base has really taken off. For example, in Q1, just over half of the monthly active users for BIM 360 were in EBA accounts"***
- Yet, **there was a reduction in cloud subscriber expectations for FY20** between Dec 2016 and March 2018, mainly driven by increased mix shift to Collections and ADSK's change in strategy.
  - **ADSK has discontinued low end products** such as BIM 360 Team, which were used for attracting customers into the funnel. The focus is on higher ARPS products as BIM 360 Design, Field etc.





Note: Revenue guidance increased, but Cloud subscription numbers decreased.

Source: ADSK



- **We would highlight that the cloud business is having a far reaching effect on the core business via EBAs that is difficult to isolate.**
- **Cloud ramp-up** is likely to be driven by BIM 360 because the market is ready and the technology is ready.
- **Value added captured in ARPS** increases for
  - Core from $750-800 in FY20 to $900-950 in FY23
  - Cloud $200-250 in FY20 to $300-350
  - Total $675-725 to $775-825

BIM 360 acceleration in growth

- The BIM 360 product focuses on taking the BIM model that comes out of Revit and putting it in the hands of the people on the job site.
  - Arguably, the initial BIM cloud products, which were all point products failed, only once ADSK moved to a bundled product did subscription take off.
- Autodesk's BIM 360 has grown subscriptions from 20k to 200k over the last three years with vast majority of those coming over the last 12-18months and ~100k last year.
  - **We expect this to accelerate over next few years as the product is in sweet spot of growth for the next 5 years**
  - There is a strong pull from the construction market for a BIM cloud product
  - **We expect BIM 360 to grow at 35% YoY over the next five years, adding on average 160k subscribers per year**

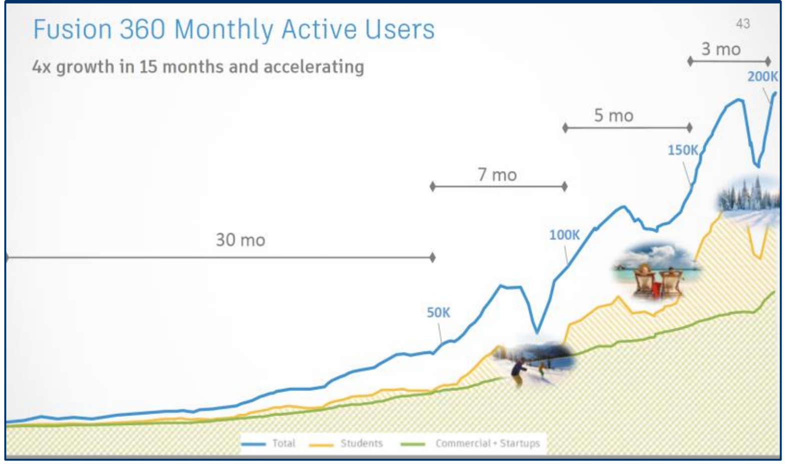
BIM 360: step change in rate of adoption

Source: ADSK

Fusion 360 growth

- Fusion is ADSK's product to break into Solidworks market in manufacturing.
  - Solidworks is exceptionally strong in the Auto and Aerospace verticals, the other verticals are slightly more open.
  - Fusion 360= CAD, CAM, CAE, and cloud PDM in one tool
  - **Fusion 360 enables customers higher integration of design and make workflow.**
- The product is still **in early stages of adoption commercially with <100k active users**, most of whom have come over the last 12 months.
  - So far the focus has been on offering the product to students and start-ups.

Fusion 360: Winning with students, startups and Enterprise



Source: ADSK

- **We expect Fusion to ramp-up to ~500k subscriptions over the next 5 years.**
- **Generative design is now available**
  - Ultimate version of Fusion 360 uses AI-based algorithms to generate multiple solutions based on real-world manufacturing constraints and product performance requirements, such as strength, weight, materials, and more.
- TAM is huge: $11bn, growing at 6-8% in manufacturing.
- ***"Nearly half of the 250k users are coming from competitor systems that are simply not keeping up."***
  - Workflow is being disrupted. It takes many years, but Fusion 360 is in a position to be a part of the disruption.

Cloud growth quarterly development

- **Q1 2018:**
  - **Cloud subscription additions +400% vs Q1 2017.** Driven by BIM 360, and "closely followed" by Fusion 360.
  - **Key buyers are on the design side,** the owner and the architect/design build firm
- **Q2 2018:**
  - **Total cloud subscriptions grew +200%.**
  - *"cloud-based BIM 360 has gained an early leadership position"* ADSK's claim is not entirely accurate, there are lots of leading software packages. All depends on definition of the vertical.
- **Q3 2018:**
  - Cloud subscriptions +150% year-on-year.
  - *"So the cloud is on fire, construction is on fire."*
- **Q4 2018:**
  - **ADSK added 45,000 cloud subscriptions, a nearly 50% decrease against the tough compare** to Q4 of last year when ADSK ran a seeding program for a component of BIM 360.
  - However, **from a billings perspective, cloud was solid**, *"several large wins, including six with top rank construction companies."*
  - **ARR for standalone cloud grew 23% in Q4**
  - **ADSK resets expectations for cloud subscription growth** due to mix, i.e. **not driving low-value cloud subscriptions**
- **Q1 2019:**
  - Cloud ARR met expectations.
  - Cloud billings remained strong, growing ~50%.
  - ***"Cloud doesn't actually reflect the full ARR impact of BIM 360, because so much of it is contained within the EBAs."***

Avg. Revenue Per Subscription (ARPS) growth

ARPS growth

- **Average revenue per subscription (ARPS) had been falling due to the transition. This troughed in Q3 FY 2017.**
- **The ARPS increase since Q3 FY2017 has been rapid in "core" ARPS**, which includes core product, EBA and Maintenance revenues. (non-cloud)
  - **However, total company ARPS increased slowly until last quarter** because of changes in the cloud pricing strategy which has seen lower value products discontinued and point products consolidated into suites.

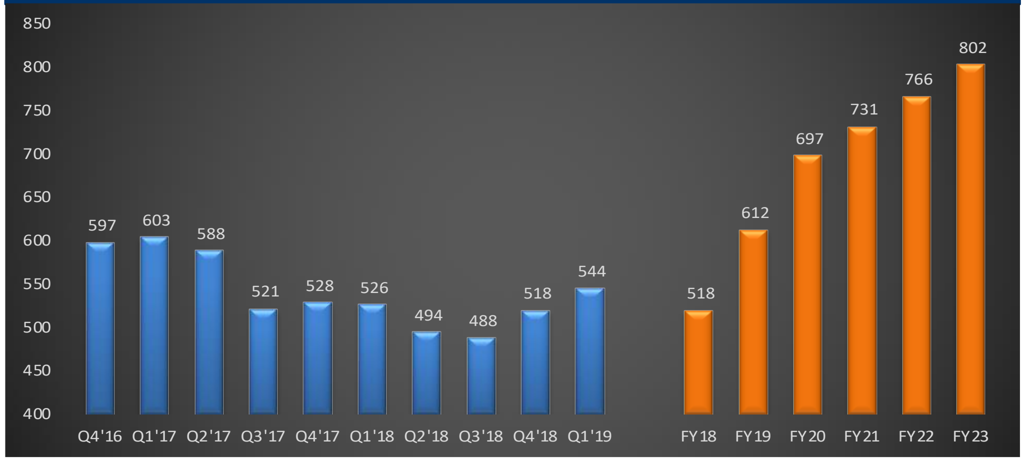
Autodesk ARPS Guidance

	FY 2020	FY 2023
ARPS (Core)	\$750-\$800	\$900-\$950
Cloud ARPS	\$200-\$250	\$300-\$350
Total ARPS	\$675-\$725	\$775-\$825

Source: ADSK

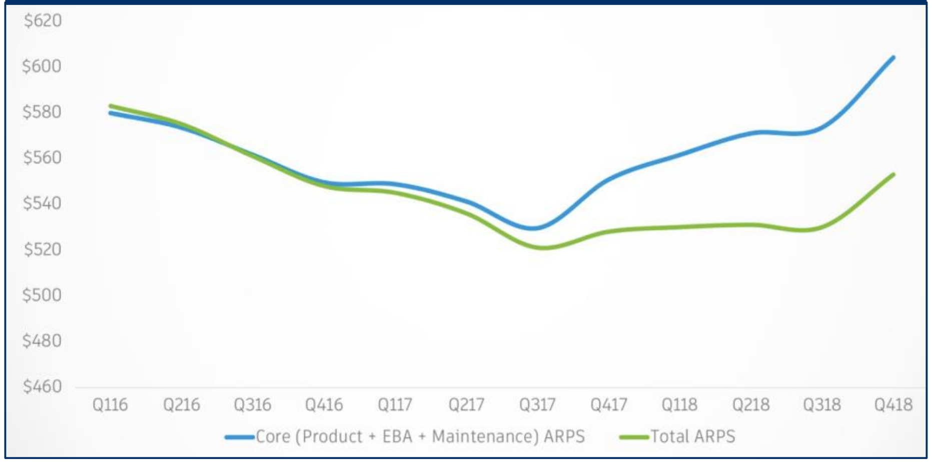
- Autodesk **FY2023 guidance points to a 4.8% CAGR in ARPS between FY20 and FY23**.
- **FY2018 to FY2020 ARPS growth is 35%.**
  - Getting comfort on this growth is critical

Total ARPS: sustainable growth of ~5%?



Source: ADSK 10Q

Core ARPS increasing rapidly



Source: ADSK

What are the ARPS growth drivers?

- **Maintenance 2 Subscription (M2S) renewals will be at a higher price**
  - For the last two years, licence holders had a "discount decision" to make. The earlier they transitioned the larger the discount (up to 60%), and they could sign a 3yr contract, therefore guaranteeing the discount for 3 years.
  - Renewal of these contracts at lower discount is responsible for much of the ARPS increase in FY19 and FY20
- **Lower pay-out to channel partners on renewals.**
  - ADSK is paying 10ppts less to resellers on renewals. This is a~25% increase in price for ADSK
- **Regular price increases for both maintenance and subscription**
  - Subscription price increases by 5% a year, while maintenance by 20% in 2019.

These two are critical. To encourage the maintenance to subscription transition ADSK has been discounting heavily.

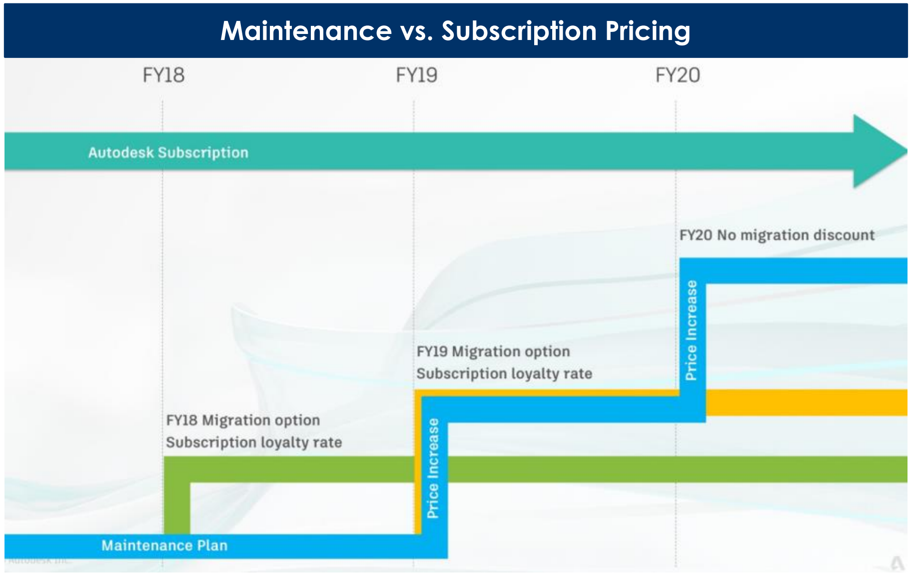
ARPS price build	
Subscription list price (est)	$1200
Loyalty discount	60%
Price paid to ADSK by M2S customers	480
Subscription price increases in 3 years = 10%	48
Channel: 10ppts to ADSK on renewal	84
Reduction in discount on list price: 8%	96
Renewal price to ADSK	708

Source: Abacus Estimates

- **Other factors supporting ARPS increase**
  - Mix shift to collections
  - Mix shift to direct sales, which comes at higher margins
  - New customer promotional discount reduction

M2S renewals at higher price

- **To force the maintenance to subscription (M2S) migration ADSK is raising prices and telling customers in advance:**
  - May 7, 2017, maintenance renewal prices will increase by 5%, 10% in 2018, and 20% in 2019.
  - ADSK offering a "loyalty price," that encourages the customer to move early
  - **Customers can lock in the discounted price for up to three years**
  - After the subscription comes up for renewal the price will be at normal renewal rates, less a loyalty discount. (We assume ~15%)
- I.e. **FY 2019 and FY 2020 will see rapid growth in ARPS as as current subscribers roll of discounted promotions**.
  - FY 2021 should see some benefit, but much lower than FY2020.



Source: ADSK

List price

How long does this spread last? Slowly ADSK is closing the gap

Customers migrating from maintenance have already bought a perpetual license, so there is some sensitivity around price for a subscription. ADSK offering huge discounts to "list price"

Increased margin on renewals

"Our best partners are in a better position now than ever before and they're investing in the business going forward."

- **ADSK paying channel partners 10ppts less on renewals** vs new sale, therefore as renewals grow, there is a natural growth tailwind.
    - 70% of revenues has been via channel partners, so a major change in ADSK's strategy.
- **In FY 2018 M2S customers had an approx. 60% discount to list price.**
    - 10ppts of list price, not going to resellers is ~25% increase in price for ADSK
- Of the increase from trough ARR, **we estimate that ~$84 of the increase in ARR is due to this change in channel margin.**

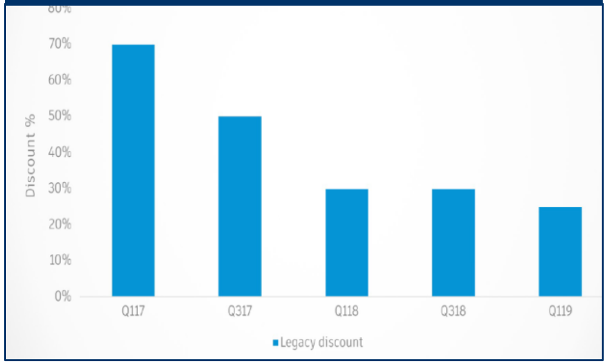
Subscription renewals excl. EBA and Cloud

Source: ADSK

Lower discounting on promotions

- Many ADSK customers bought a perpetual license, and chose not to pay maintenance.
  - **Therefore ADSK has been discounting subscriptions heavily to push non maintenance customers to a subscription**
  - The initial discount offered was 70% in Q1 2017.
  - We would bet that complexity / file sharing workflow will probably be the key to success and force migration longer term.
  - We would also argue are less inclined to convert unless the product offers a tangible benefit.

Decreasing Discounts



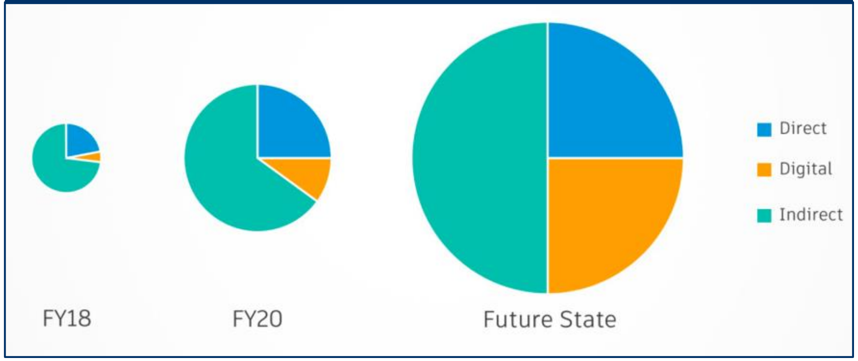
Source: ADSK

- ADSK has run a conversion-program in Q1 and Q3 over the last two years
  - **In each instance, it's yielded between 24,000 and 28,000 subscription additions** from the ~2m pool of users who don't pay maintenance. **I.e. 50-60k conversions per year.**
- Discounting change has limited impact on ARPS:
  - Assuming FY20 gets full benefit of 70% discount being removed from FY17 = 60k * $550 = gives $33m in revenues
  - $33m x 0.7 = $23m additional revenue = ~$6 increase in ARPS. Not a huge amount, and It will be spread out.
- **Today subscribers save 15% on a new 1-year or 3-year subscription with a trade-in of a perpetual license not on a maintenance plan.**

Growth in direct sales driven by digital customers

- **This is clearly a risky part of the strategy, but has a potentially high payoff**. 70% of sales currently come from the channel.
- **Moving to subscription means that ADSK products have a slower payback for resellers** vs competing products, sold on license + maintenance on the market.
- **Channel Partners in decline:**
  - Pre transition: 2,600 to 2,800 channel partners
  - June 2018: ~1350
  - TechData Corp (reseller) was 31% of revenue in FY 2018.
- The bet ADSK is making, as Abacus sees it:
  - **For New users, subscription is the best way to move forward**, as lower cost of entry and exit, more flexibility etc. They will increasingly come direct. (ADSK needs to invest more in S&M)
  - **Channel for existing users : Assume they can't switch.** Workflow / product investment too high. Therefore, the value added by channel is in fact not critical, except in getting new customers.

Direct Sales Mix Guidance



Source: ADSK

Direct and digital impact

- **There are two changes in the direct to customer strategy:**
  1. **Internal sales team.**
     - Enterprise focus: customer success managers, dedicated enterprise priority support, more handholding in general.
       - EBA: 3-Year (FY15–FY18) 55% CAGR in ARR
     - Also telesales going after "non-compliant" accounts. (not paying for all the product they are using)
  2. **Building out a DTC eStore.**
     - **<u>This is probably the single most important driver.</u>**
     - **E-store has a very high margin relative to any other channel**
     - Digital sales has been a significant driver with an **ARR of >$140m in Q4 2018 (~7% of sales) but had a 65%yoy growth**
     - **Around 50% of the new subscriptions sold on e-store are net-new customers**.
- **FY 2018 digital and direct distribution is 30% or sales to go to 50% of sales in FY20**. This change is partly driven by cloud subscriber additions, which usually come direct.

Collections

- **10 years ago ADSK started shifting its business towards suites.**
  - A bundled product had more relevance for their higher end customers and enabled Autodesk to capture all of the workflow.
  - **This has continued, although they are now called collections and have been simplified further.**
  - Managing multiple licenses became an issue. Today all collections are single user license.
    - **Today there are there collections by end market:**

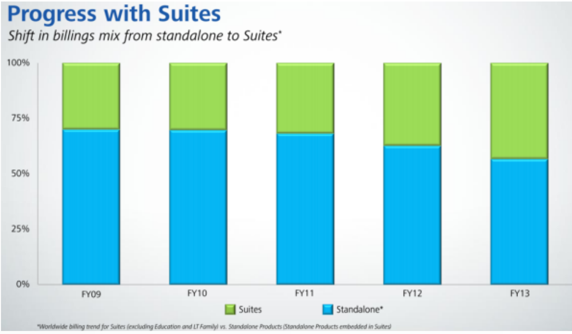
ARCHITECTURE, ENGINEERING & CONSTRUCTION COLLECTION

PRODUCT DESIGN & MANUFACTURING COLLECTION

MEDIA & ENTERTAINMENT COLLECTION

- **Accelerated conversion to collections has becomes a headwind for subscription numbers**. However, it has a positive impact on ARR and hence is net beneficial to ADSK.
- **In Q1 2019** ADSK mentioned that **collections subscription additions increased >30% sequentially and makes up a quarter of the base of product subscriptions**
  - ADSK has also been simplifying its product offering, consolidating point products into broader products.
  - E.g. **ADSK's Fusion is going to go from nine subscription products down to three. Fusion 360, Fusion Lifecycle, Fusion Production.**

Shift to Suites started 10 years ago



- **Mix shift to collections has caused a bit of concern in the stock**, however lower subscription numbers are offset by higher ASPs. I.e. there is no detriment to the business, it is just how they are reporting it.
- **The most important number to follow remains the growth of ARR.**

Mix shift to collections

- Upselling to collections has been very successful since it was started couple of years ago.
  - **Customers are gravitating toward a collection with a price of ~$2,400 versus a point product like AutoCAD at $1,500 per year.**
  - Currently **~20% of subscribers are using collection/suites**, with Autodesk guidance that this will go to 30% over the next 5 years.
    - **One third of maintenance renewals were converted to collections** leading to collections subscriptions growth of >60% in FY18.
- **Customers are shifting to collections as increasingly workflow requires more than one product.**
  - This is a long term trend, however simplifying the product offering and integrating the product was necessary before this could happen.
  - It remains unclear to us if ADSK replatforming is on the surface or goes much deeper. Integration within collections and modularity of software is unclear to us.

Collections as %of Subscription Base

Manufacturing Collection vs. Single product Pricing

COLLECTION INCLUDES	IF PURCHASED SEPARATELY
Inventor Professional	$1,935.00/year
AutoCAD Now includes AutoCAD toolsets for mechanical, electrical, and more	$1,575.00/year
Autodesk Nastran In-CAD	$3,570/year*
Inventor HSM	$3,700/year*
Nesting Utility	Not sold separately
Fusion 360	$310.00/year

Get the entire collection for
$2,525.00
per year, single-user access
(multi-user access also available)

SUBSCRIBE

Talk to a sales representative
1-844-335-4986

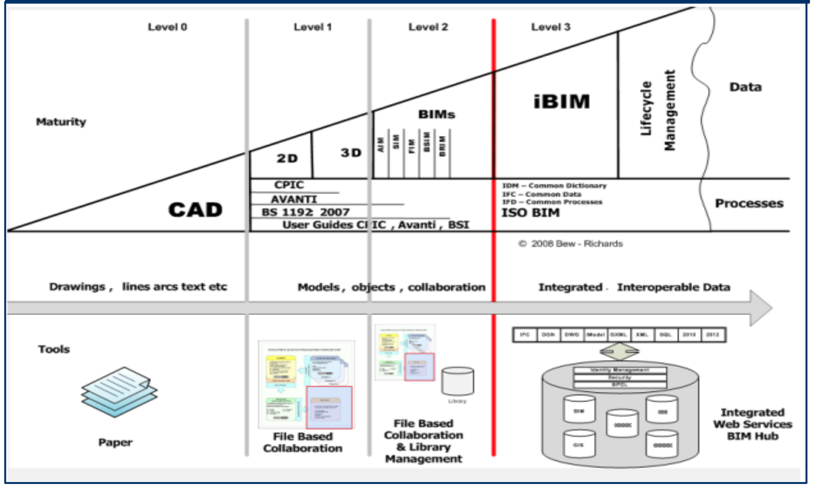
Have Autodesk contact you

Why BIM? Why now?

BIM

- **BIM is simply a term used to describe the disruptive change happening in AEC from applying digital workflow to what has historically been an analogue industry.**
  - BIM is a collaborative, interdisciplinary model centric approach to improving operations. **Similar to Lean in manufacturing, BIM is technology enabled constant improvement in the construction world.**
  - The reason it will take a very long time is because projects are realised collaboratively, rather than within one firm.
  - **The UK is one of the leaders in this disruption, this is how they describe different levels of BIM:**

UK model to describe levels of BIM



UK BIM maturity model, developed by Mark Bew and Mervyn Richards.

- **Level 0** is defined as unmanaged CAD. This is likely to be 2D, with information being shared by traditional paper drawings or via PDF. Essentially separate sources of information covering basic asset information.
- **Level 1** is a **mix of 2D and 3D** information using BS 1192 with a collaboration tool providing a Common Data Environment.
- **Level 2** is described as **collaborative BIM**. This is the first level where there is a common data source/ library.

- BIM is slowly but surely replacing CAD as the preferred medium for planning and modelling AEC projects.
  - The **objective of BIM Level 2 is to improve outcomes for all parties involved in project delivery and operation.**
  - However, BIM is also changing workflow, therefore it is very challenging for it to happen quickly.
- **BIM success necessitates that all parties working on a project can share information freely.**
  - Contracts, however, often forbid such information sharing due to liability and litigation concerns

Collaboration workflow

The key change happening in the workflow is how collaboration is happening.

- Taking a leaf rom the lean handbook, **this change can only happen in complex supply chains if all participants are digital** (occurred over the last 20 yrs) **and have the ability to exchange and integrate data easily.**
    - It is the data exchange that is changing collaboration.
    - Increasing data exchange mandates that users have more standardised software that can integrate easily with each other.
- **Collaboration is driving the platformisation of the manufacturing and construction design/build workflow.**
    - This is why we are so positive on the longer term trend.
    - Swapping files and coordinating progress is much more straightforward with a dedicated project collaboration tool.
- **Why is it happening now?**
    - Tools available, cloud and connectivity maturing.
    - Forcing factors from owners of capital.

Vertical strength matters

- **Becoming entrenched in the workflow is all about verticals:**
  - Different companies have different strengths in the current workflow that they sell from
  - Autodesk Is dominant in the plan&design part of the process, and has a strong position to sell from.
  - **Construction management software (build) is currently in land grab mode.**

Plan & Design	Build	Manage
	Construction management software	

Plan & Design

- Produce information models
  - Design, analyse, document
  - Architect, structural, Mechanical, electrical engineers.
  - Use: Revit or Nemetscheck product.
  - Final stage is a 3D, 4D or 5D model.
- **Originators work in a highly collaborative environment, with many different skill sets.**
  - Customer demands dictate complexity of what gets produced.
- **Autodesk is the dominant technology provider for plan & design.**

Build

- The build phase
  - The project managers are key people on project realisation.
  - Select subcontractors.
- **Tender teams:** Bid on tender based on *design drawings and Bill of Quantities.*
  - *5D BIM helps in this area and would be integrated into the original model.*

Many companies fighting for market share here today, including ADSK

- **Site team:** Build the plans from the Originators.
  - Model input is problem solving.
  - **Profit is all about efficiency of the build process**. This is the key driver for construction companies.
  - Mobile/ iPads are being adopted / drivers.

Not natural buyer of Autodesk products, TRMB has a strong market position.

Manage

- If the client commissioning the building is the final tenant, then building management will influence the plan & design stage.

Different levels of BIM

- Again, BIM is like lean, some companies or projects take it much further than others.
- **The basic building blocks are a shared data environment and a 3D model.**
  - There are 3D to 6D models, each level adds an extra information component.

Current process has huge knowledge losses built into the building life cycle

Source: The Future of Making Buildings, Phil Bernstein, TEDxYale

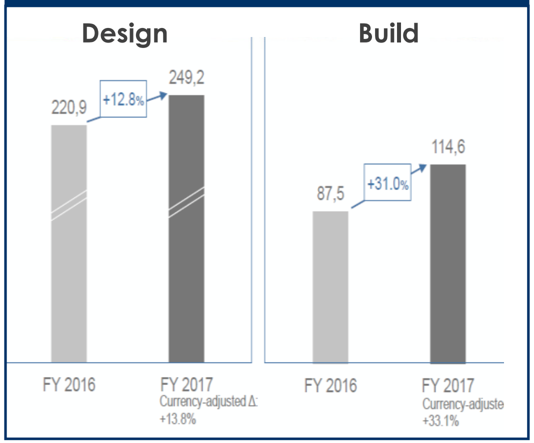
The current process has multiple points where the same information is entered. Throughout the process there are **huge losses in data during transfer from one discreet process to the next.**

- **3D BIM is is the most basic interpretation of BIM:**
  - Creating graphical and non-graphical information and **sharing this information in a Common Data Environment (CDE).**
  - As the project lifecycle progresses this information becomes ever more rich in detail until the point at which the project data is handed over to a client at completion.
- **4D (Construction sequencing):**
  - **4D BIM adds scheduling data**. Information can be used to obtain accurate programme information and visualisations showing how the project will develop sequentially. Time-related information for a particular element might include information on lead time, **how long it takes to install/construct, the time needed to become operational/harden/cure, the sequence in which components should be installed,** and dependencies on other areas of the project.
- **5D (Cost)**
  - Using the components of the model, and being able to extract accurate cost information. **Automating the bill of materials** generation.
- 6D BIM (Project lifecycle information)
  - Sometimes referred to as integrated BIM or iBIM, 6D BIM involves the inclusion of information to support facilities management and operation to drive better business outcomes.

Where are we in the BIM adoption curve?

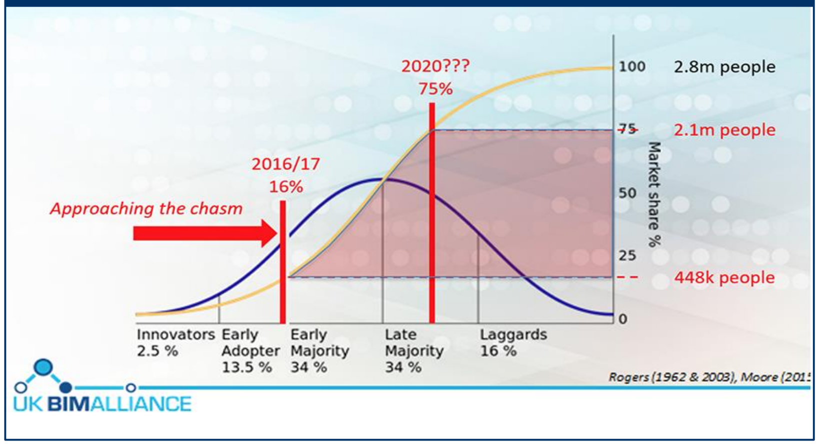
- BIM has been around for a long time, but from our research **we think is just hitting the sweet spot of the adoption curve.**
- **The highest growth (20-30%) is happening in the "build" segment,** It is also where all the competition is. The **key players are:**
  - Nemetschek (NEM GY), Trimble (TRMB), Dassault, which has just started investing in the vertical. Bently, which is more focused on civil. Syncro (link 1, link 2 to give you a better idea on what BIM implementation does) and Procore, a startup unicorn.
- BIM adoption takes at least a year, and focuses on changing workflow, it is painful for all involved, therefore not something that happens quickly.
  - **Barriers to adoption are people, process and technology,** with technology by far the easiest problem to solve.
  - To be effective, a BIM implementation must reach across a business. It cannot be an IT initiative, or an R&D one, or done solely at a project or disciplinary level.

Nemetscheck Growth driven by Build



Source: NEM GY

UK BIM Alliance: Best Part of the S-curve?

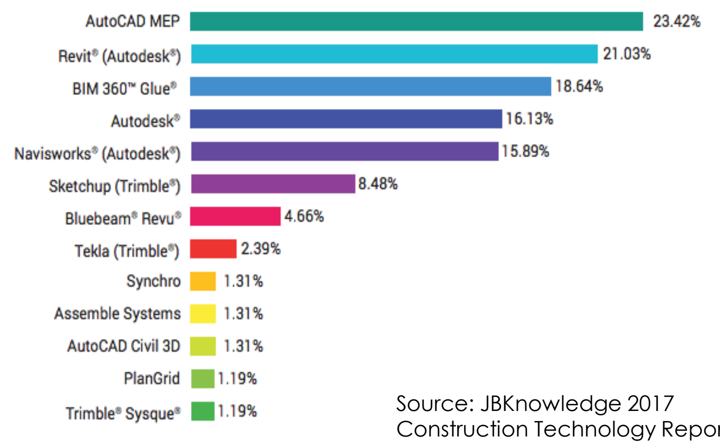


Source: UK BIM Alliance

BIM leaders

- **Autodesk is a clear leader for BIM software**
  - Sketchup is the first non-Autodesk product in the list.
  - Revit is the leading software in multiple surveys.
  - AutoCAD MEP has industry-specific toolset for mechanical, electrical, and plumbing (MEP) included in the AutoCAD software.
- **BIM necessitates the use of 3D drawings.**
  - All the incremental benefits (4D-6D) stem from the information contained within the 3D model.

Autodesk share of BIM software



Source: JBKnowledge 2017 Construction Technology Report

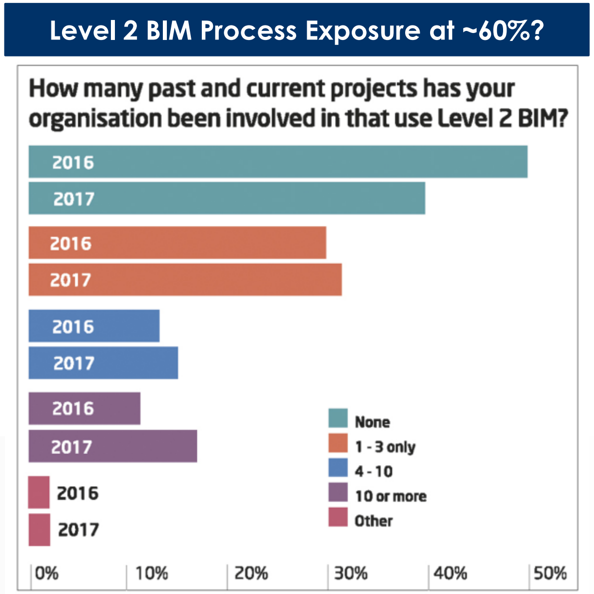
- **However, this survey is unfair to the other products. So far, the build part of AEC has had little attention paid to it.**
  - What the surveys, such as the one above are really telling you is that design segment is well penetrated, and the build segment is poorly penetrated.
  - **Unfortunately there are no surveys on just the build segment of the market.**
  - Getting iPads to workers is step one. Removing the paper trail and using a centralised DB for up to date plans.
  - **Competition for the workflow of the build phase is very high, as it is a new sale.**
    - REVIT and AutoCAD market position has limited influence on the software selected in the US.
    - In Europe the architect is in a stronger position to influence the decision.
  - Consolidation beginning to happen: TRMB, Nemetscheck, Autodesk are the consolidators.

The U.K.

- **It is widely accepted that due to the U.K. government's efforts, the U.K. is now at the forefront of the global BIM programme.**
- BIM adoption drivers: Centralised body sets industry standards
  - 2011 government strategy paper calling for what is now know as BIM Level 2.
  - **2016: The UK Government forces the use of BIM Level 2 on all Government procured projects**. To win tenders, companies must be BIM compliant.
  - The U.K. pushed for BIM due to potential savings of 15% to 20% on construction costs
    - **The UK Government identified that its BIM Level 2 Initiative was a significant contributor to the £840 million savings achieved on its public spend in 2013/14, and on its £1.2 billion savings in 2014/15.**
    - Large government organisations are also talking about the savings generated while running the building. This seems to be an increasingly important consideration.
  - **Setting specifications for the tendering process is key.**
    - In the UK, bodies that commission public works such as National Rail and Highways England set criteria for mundane things such as data entry, which is then carried over into private contracts.
  - That is not to say that it is plain sailing. The UK government is apparently doing nothing to police BIM compliance, and government bodies who are commissioning buildings are often unaware of what BIM means.
- **Industry in the UK is now talking about BIM level 3**, although the majority of the industry has to have reached level 2 before level 3 can become a reality for the leaders. The cloud is accelerating this.

BIM Adoption not as rosy as U.K. Mandate, but it is still driving increasing BIM use

- *Construction Manager* 2017 Survey: 392 respondents.
  - Magazine of the Chartered Institute of Building. UK & global organisation.
- **51% agreed the government had not lived up to its target of making BIM use a requirement when selecting firms.**
  - At local level, where BIM is not mandated, respondents said that local authorities did not understand BIM.
- The private sector: 72% said clients in general did not understand the benefits of BIM.
- **However, the survey pointed to increased awareness and take-up of BIM,** indicating the government's BIM policy had nonetheless helped drive increased adoption.
  - **62% of respondents now use BIM, up from 54% in last year's survey**. The 8% increase in BIM penetration was the biggest recorded by the survey since 2014.
  - Of those firms that do use BIM, most are convinced of the benefits, with **70% saying BIM will help bring cost reduction, while 60% believe BIM will help save time.**



Europe

- **Many countries are embracing BIM including Spain, France, Ireland, Germany, Norway, Denmark, Finland, Sweden.**
  - E.g Spain has a BIM Commission sponsored by the Ministry of Public Works for BIM to be applied in buildings in 2018 and in infrastructure in 2019.
  - In Denmark, there will be a mandate for all projects in 2022.
  - **Germany, the government will require a BIM mandate for public infrastructure projects by 2020.**
- In 2016, the European Commission asked the EU BIM Task Group to help align public sector use of BIM across Europe.
  - The group published a handbook in July 2017, detailing why BIM should be embraced. Since then counties have just got on with what they were doing before.
  - In the U.K adoption of BIM by large public sector bodies was critical in accelerating adoption of BIM and pushing the industry towards BIM level 2.
- **Despite increasing adoption of BIM very little research has been carried out to examine penetration in different geographies.**
  - Today, across Europe the highest maturity level is in "document/model referencing and version control" as 79% of projects in Europe use this low level building block for BIM.
  - However the importance of a getting to a shared database should not be underestimated. Without it, none of the other benefits of BIM are possible.
  - Another highly mature criteria in Europe is the implementation of BIM Execution Plan (BEP), which is used to specify roles, identify how information is exchanged and formalise strategies for BIM processes, tools and technologies.

U.S.

- **BIM is seeing a natural adoption curve in the U.S, but it s not driven by any centralised agency.**
  - *"The mileage the US gets out of its BIM projects – like the standards used – varies widely, depending on how seriously both the clients involved and the practitioners take BIM, on any given project as well as their knowledge and understanding of BIM,"*
  - *"One notable thing I will say about BIM in the US is that I don't have to look far to find real examples of projects that are done well, all the way down to the details, well beyond the lustre of marketing material."*
  - **No nationwide program, some stale level programs.** Pen State Standards ae widely referenced: helps people understand why they are creating content.
- **Adoption happening due to pragmatism**, proving that BIM is at a critical point in its adoption curve.
  - E.g. The LACCD (Community College, $3.5bn multi year onstruction budget) have mandated the use of BIM on taxpayer-funded construction projects, including a focus on the savings that come after construction is complete.
  - The private sector tends to implement BIM solutions on a project-by-project basis with no real consistency or clearly defined approach.
  - **Nemetsheck, sees BIM in U.S. more advanced than Europe, close to U.K.**
- Several U.S. government agencies charged with managing civil infrastructure projects have moved to BIM.
  - The General Services Administration (GSA), which manages all the federal buildings around the U.S., is one agency that has fully adopted BIM in 2003. But since the credit crunch the GSA has been largely de-funded, so it's not building anything, therefore the standards can have no effect.
  - The Department of Veterans Affairs (VA) published its first BIM user guide in 2010.
  - State of Ohio issued what it called a "BIM protocol," which provides general guidance for the state's vendors
  - Maryland and Wisconsin have their own BIM standards.
  - Private sector initiatives, such as the American Institute of Architecture's protocols, and standards from the construction associations.

Valuation

Upside: $184 +40%

- DCF based Upside scenario, the main assumptions are:
  - ADSK can add **700k new subscriptions per year**
  - **ARPS increases to $700 in 2020, and increases to $800 in 2023.** Inline with company guidance.
    - ARPS increases to $700 in FY2020 largely driven by lower discounting on renewals and further increases by 4.5% pa to FY23
  - ARR for FY23 year end of $5.6bn, based on 7mn subscriptions and ARPS of $800.
    - **In FY 2023 we estimate that ADSK would be growing revenues at 17%**
    - In our DCF we have assumed revenue grows by 9% pa for 10 years after FY23 and then terminal growth of 2.5%
  - **Costs**
    - We assume modest cost increase to FY23 giving an operating margin (ex SBC) of 46.8% in FY23, close to the ADSK target.
    - We assume margins peak at 46.8% then remain stable.
    - I.e. **operating cost grow at 0% yoy until 2020, then accelerates to 7-9% growth, ending up inline with revenue growth by 2023.**
  - **Free Cash Flow**
    - **Our Free Cash Flow assumption for FY23 is $2.0bn versus ADSK estimate of $2.5bn** due to:
      - lower deferred revenue increase as revenue growth assumption reduces
      - **Fully expensing of stock based options (our standard assumption)**

	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Total subscribers (k)	2,578	3,105	3,716	4,241	4,941	5,641	6,341	7,041
ARPS ($)	533	530	553	620	698	731	766	802
Revenue	**2,504**	**2,031**	**2,057**	**2,455**	**3,070**	**3,817**	**4,521**	**5,283**
Total growth			**-5%**	**19%**	**25%**	**24%**	**18%**	**17%**
ARR	-	1,646	2,054	2,630	3,450	4,125	4,857	5,650
Sales & Marketing	1,016	1,023	1,087	1,091	1,102	1,179	1,262	1,350
G&A	293	288	305	308	311	327	343	360
R&D	790	766	756	763	771	825	882	944
Pre-tax income	174	(225)	(200)	210	833	1,380	1,882	2,429
Adj Operating Margin	**8%**	**-10%**	**-8%**	**10%**	**28%**	**37%**	**43%**	**47%**
Net income	174	(225)	(200)	178	683	1,132	1,544	1,992
Free Cash	**342**	**94**	**(50)**	**211**	**1,048**	**1,448**	**1,896**	**2,060**

Downside: $107 -18%

- DCF based downside scenario, the main assumptions are:
  - ADSK can add **500k new subscriptions per year**
  - **ARPS increases to $700 in 2020, and increases to $800 in 2023.** Inline with company guidance.
    - In our DCF we have assumed revenue grows by 6% pa for 10 years after FY23 and then terminal growth of 2.5%
    - Revenue in 2023 of $4.7bn, or ARR of $5bn.
  - **Costs**
    - We assume modest cost increase to FY23 giving an operating margin (ex SBC) of 41.6% in FY23
    - We assume margins then remain stable.
    - I.e. **operating cost grow at 0% yoy until 2020, then accelerates to 7% growth, inline with revenue growth**.
  - **Free Cash Flow**
    - **Our Free Cash Flow assumption for normalised FCF in FY22 at $1.5 bn** due to:
      - lower deferred revenue increase as revenue growth assumption reduces
      - **Fully expensing of stock based options (our standard assumption)**

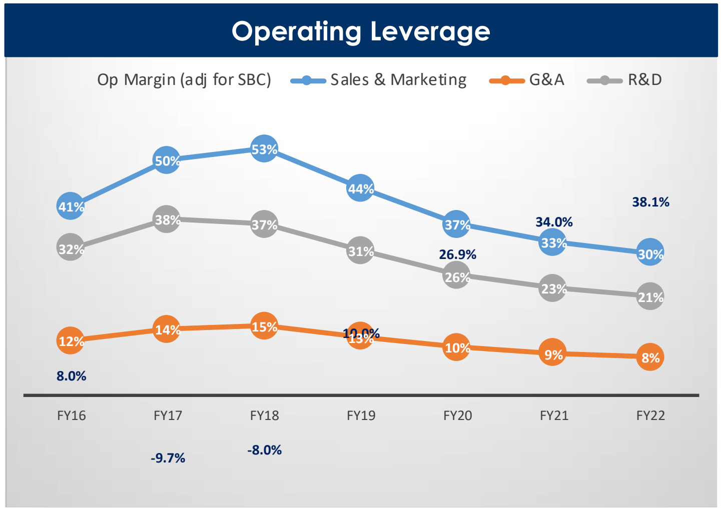
	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Total subscribers (k)	2,578	3,105	3,716	4,241	4,741	5,241	5,741	6,241
ARPS ($)	533	530	553	620	698	731	766	802
Revenue	**2,504**	**2,031**	**2,057**	**2,455**	**3,000**	**3,601**	**4,145**	**4,733**
Total growth			**-5%**	**19%**	**22%**	**20%**	**15%**	**14%**
ARR		1,646	2,054	2,630	3,310	3,832	4,397	5,008
Sales & Marketing	1,016	1,023	1,087	1,091	1,102	1,179	1,262	1,350
G&A	293	288	305	308	311	327	343	360
R&D	790	766	756	763	771	825	882	944
Pre-tax income	174	(225)	(200)	210	522	924	1,263	1,631
Adj Operating Margin	**8%**	**-10%**	**-8%**	**10%**	**27%**	**34%**	**38%**	**41.6%**
Net income	174	(225)	(200)	178	428	757	1,035	1,337
Free Cash	**342**	**94**	**(50)**	**211**	**905**	**1,177**	**1,489**	**1,507**

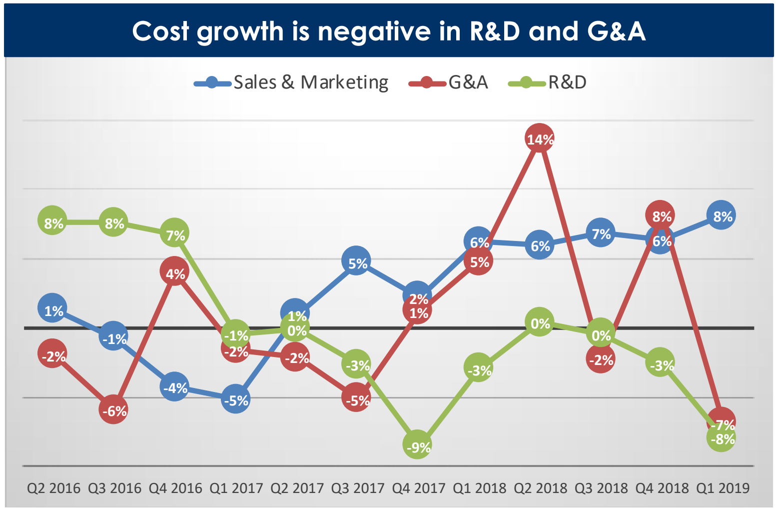
Restructuring

- **Activist investors become involved in ADSK in 2015.**
  - Sachem Head Capital and Eminence Capital LP built an11.5% stake in the company.
  - Took director positions, forced out old CEO, stepped down from board when new CEO was put in place.
  - The activists had been pushing for cost cuts and buybacks (ADSK agreed to a $2 billion buy back)
  - Activists left the board on 19/6/2017
- **4Q FY 2018: commenced a world-wide restructuring plan**
  - "to support the Company's strategic priorities of completing the subscription transition; digitizing the Company; and re-imagining manufacturing, construction, and production."
  - **Targeted more efficient spending both in S&M and R&D that were not aligned to new strategic priorities.**
    - Guidance for non-GAAP spend to be flat in fiscal 2019.
    - Pre-tax restructuring charges of $135m to $149m
      - $124 million to $137 million of which would be for one-time employee termination
      - $11 million to $12 million for facilities-related and other costs.
- **R&D has been reducing headcount**. $'s spent been coming down for 2 years.
- **Total advertising expenses** were $31.1 million in fiscal 2018, $33.6 million in fiscal 2017, and $29.8 million in fiscal 2016.
  - This seems to be a very low number for a company increasingly going DTC.

Operating cost growth

- Autodesk has manged to keep total operating costs approximately flat from FY2016 to FY 2018.
  - **Guidance is for “<1% Spend CAGR FY 2016-FY2020.”**
  - In aggregate, ADSK has so far manged this.
    - Looking at the subcomponents, there is some growth in sales and Marketing, which is being ofsett by R&FD and G&D savings.
- Given the underlying growth in the business we are concerned on:
  - Underinvestment in S&M
  - Underinvestment in R&D
- **Post FY2020, what will the growth in operating costs be?**
  - In our upside scenario we estimate 7% operating cost growth from 2020-2023, giving a peak operating margin of 46.8%.
  - In our downside scenario we also assume 7% operating cost growth, but a slower increase in revenues, arriving at peak operating margins of 41.6%.





Sector has been revalued

- Multiple expansion across the group
  - EV/Sales (blue line) and P/E (orange bars)
- Except TRMB, which has other issues.

Dassault (DSY FP) Valuation

Nemetschek Valuation

Trimble Valuation

Company Change

Platformisation

- There are platforms being created right now. Will Autodesk be the dominant platform?
- **Shift to subscription model changes the playing field:**
  - Previously: A client requires you to use a specific software version, e.g. request for Revit 2010 or AutoCAD MEP 2012, to integrate with them. Subscription model renders this irrelevant.
  - Today: If a client is going to put the CAD/BIM requirement in, it will force an upgrade to subscription for the laggards. Same price, so not a cost discussion.
  - Finally gets all Autodesk customers onto the same software, enables all modern capabilities.
- **Collaboration is a strategic asset**, and barrier to entry. Basic file sharing is a key consideration.
  - Managing file sharing, version, vault history, access etc are critical tasks.
  - Given the dominant position that Autodesk has, this market is theirs to lose.
- **Forge Platform:**
  - Similar to salesforce.com: Facilitate third-party development of complementary products
  - Api based interaction with ADSK software / installed base.
- Digitisation:
  - eStores around the world.
  - Autodesk Knowledge Network
  - *"We have chat capabilities and we have virtual agents overall. We have webinars. We have trial downloads. All these things have been digitized to drive scale overall." AVA – digital assistant example. 12hrs to 5mins to solve problem.*

Culture Change:

- **Autodesk has a lot of work to do to reach a modern architecture and workflow.**
  - Some of the big criticisms for the company are lack of innovation in the products.

- **ADSK is slowly transitioning from a highly siloed workforce, with focus on individual products with different source codes.**
  - Historically they recreated tech stacks and tools for each individual product. Our understanding is that this continues to be a dominant force.
  - Behavioral and cultural problem more than a tooling or technology issue.
  - Given the number of products, these problems take a long time to solve:
    - *"I worked with our legal department to have a better source code policy that said that our source control repositories could be more open so that engineers could have access to one another's code bases. That was an enabler for collaboration. Then we started to get onto one set of tools so that people could find one another's stuff and find information."* Minette Norman Vice President of engineering practice
  - CTO: *"we need to collaborate, to get out of these silos where we can't see each others' code. Going to move to GitHub as a forcing function."*

- Agile evolution
  - **ADSK is slowly evolving to an agile workflow**, however given the siloed nature of product groups, this takes time.
  - Switch to subscription and launch of cloud products all show ADSK moving in the right direction.
  - We can find no data to prove that innovation is increasing.
  - AWS being used for the cloud products.

Cloud is an enabler of innovation

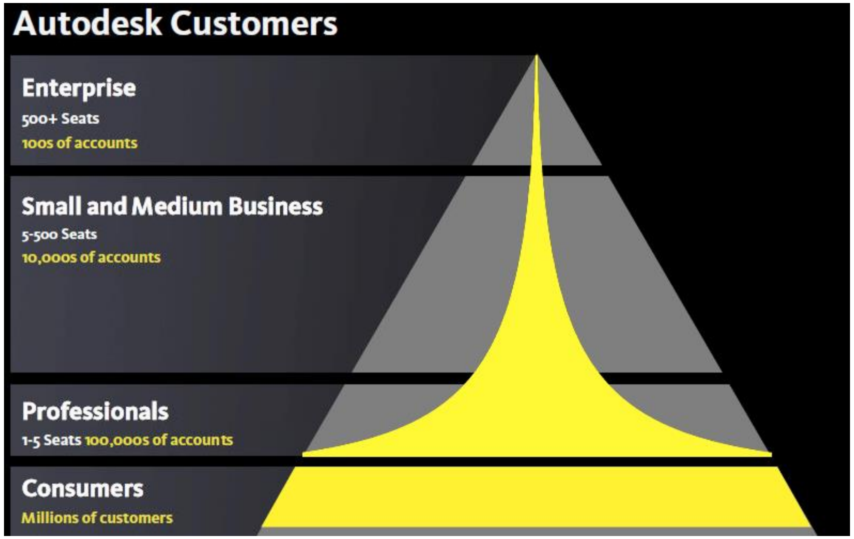
- **Cloud is the enabler of value added services:**
  - ADSK is utilizing the cloud to allow customers to collaborate much better.
  - The importance of file sharing in a controlled environment should not be understated. Large projects are hugely complex and have many teams and companies working on the same project.
  - Enabling more efficient collaboration is step one in successful BIM.
  - **Cloud also enables BIM models to be taken into the field and the construction/build industry, which is the high growth market of today.** Cloud brings the much needed collaboration plus mobility to make the workflow more efficient.

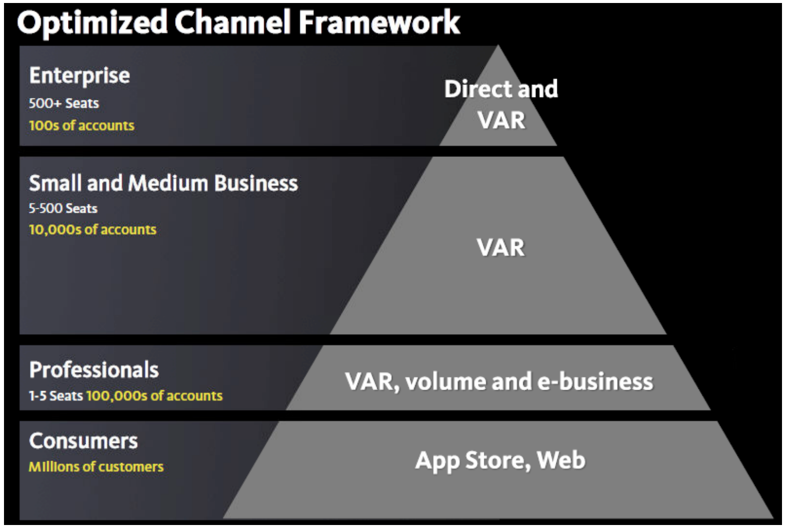
- **The cloud has the potential to radically alter workflows longer term.**
  - As soon as files are stored in the ADSK cloud, **ADSK can use the cloud (AWS) to sell value added services.**
    - E.g. to do rendering or fluid dynamics calculations on a design. I.e. **ADSK is building the ability to have a much more direct and self-service interface with customers.**
  - **Autodesk 360 Cloud Credits** required to perform certain tasks, such as creating a rendering or running a simulation in a cloud environment using Autodesk cloud services.
    - $100 for 100 pack of credits.
  - **Infinite compute power on demand has the potential to radically increase demand for renderings and simulations.**
  - **Time savings:** produce renderings in a fraction of the time it took before, hours to minutes for most rendering, frees up designers/engineers computers for project work.
    - This also **enables generative design. Multi simulation rather than pass/fail answers.** (Potential game changer for industry)

What can go wrong?

- **Innovation does not pick-up**
  - In the past, **Autodesk has been known in the industry for lack of innovation.**
  - After introducing a very powerful product AutoCAD that changed the industry from paper to digital there were only modest improvements.
    - Because of lack of innovation, historically there was limited desire for customers to sign maintenance contracts due to limited product improvement
  - Key advantage of subscriptions and cloud products is ability to introduce innovation and better product. Is the Autodesk organization ready for this cultural change?
  - **Success so far with innovations around BIM360 and Fusion360 does indicate that Autodesk gets it and is likely to be more innovative than in the past.**
- **Non-homogenous market with many verticals that limits the TAM**
  - It becomes impossible to jump between verticals because of their peculiarities
  - For example, construction could remain split between infrastructure and building with different solutions and players dominating those verticals
  - Or manufacturing remains split between process industries and sectors such as aerospace, automobiles etc.
- Acquisitions
  - Historically ADSK has been acquisitive, buying R&D and leading product in newer markets.
  - We would expect the same within the build market.
- **Cyclical downturn in construction**

Appendix


Autodesk Customers
Enterprise
500+ Seats
100s of accounts
Small and Medium Business
5-500 Seats
10,000s of accounts
Professionals
1-5 Seats 100,000s of accounts
Consumers
Millions of customers


Optimized Channel Framework
Enterprise
500+ Seats
100s of accounts
Direct and VAR
Small and Medium Business
5-500 Seats
10,000s of accounts
VAR
Professionals
1-5 Seats 100,000s of accounts
VAR, volume and e-business
Consumers
Millions of customers
App Store, Web

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This research was produced by Vipin Ahuja, Partner and Robert Graham-Brown, Partner.