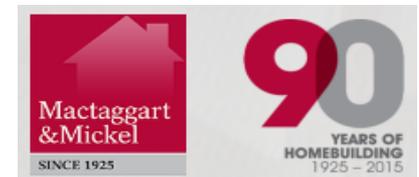


Digital Design, Construction and Sales

(BIM Pilot Project)

HBF Technical Conference

21st September 2017



Stewart Dalgarno – Director of Product Development SMG

BIM (Building Information Modelling) What is it?

- **Collaborative** working, using **digital** information to **streamline** design, construction and sales **processes**, in a more effective integrated way, reducing waste, downtime, errors and re-working.
- It's a potential **smart** way, to **add value** to customers, businesses and roles, bringing differentiation and competitive advantage.
- It's an **integrated** business process, driven by new **parametric** software systems, that embeds **information** in to 3D building models, that **simplifies work flows** & information, improving **efficiency**

Digital Working BIM - why?



- Top 20 medium sized, 5 star house builder
- 1,000 homes per year, in 3 locations
- UK Largest Offsite Timber Frame Supplier
- OSM Capacity 14,000 per year



BIM Strategic Project – Pilot Study

Phase 1 Feasibility

- Understanding the technology & people issues
- Evaluate the requirements (pros & cons), through shared learning
- Assemble the business case for change

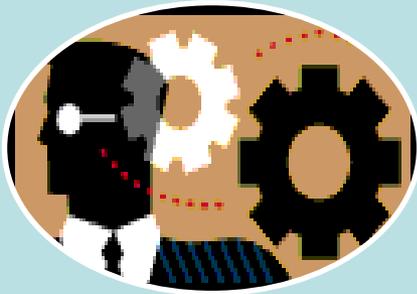
Phase 2 Trialling

- Deploy BIM at a development scale
- Measure and re-verify the business & people benefits
- Recalibrate approach and strategies – from further learning

Phase 3 Implementation

- Agree sign off strategic investment
- Rollout full implementation - shift to BIM enabled business platform
- Review and refine post implementation

Project Objectives



Technical -
BIM Modelling &
Supply Chain
Components



ICT Systems -
Hard & Software



People – Skills,
Behaviours &
Cultures

Business Case for Change

1. Mobilisation
2. Supply chain readiness audit
3. Training and skills gap analysis
4. Cultural fit & behavioural assessment
5. Component Libraries
6. ICT technology assessment
7. BIM models – range of house types
8. Process mapping – old v new
9. Training Plan – with providers & materials
10. Cultural & behavioural change plan
11. Final project report & Business case
12. Project dissemination – end of project event



Flexible Innovation
Funding

Quarterly Monitoring
& Evaluation

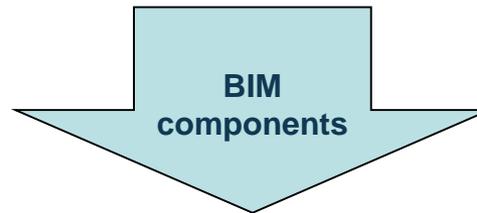
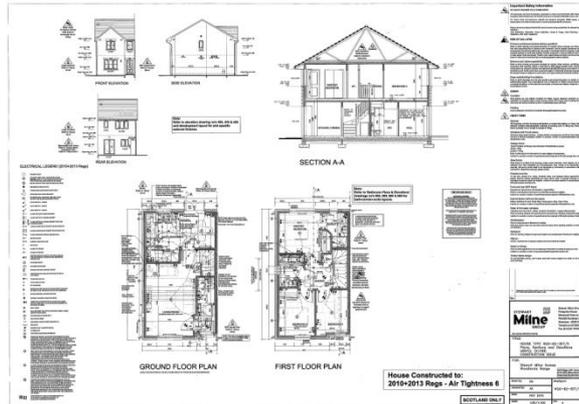
Pilot Study – The Business Case for BIM (SME House Builder's)

- Digital working has potential for **£3,500** saving per plot
- Savings could be **£3m** per year
- Digital working will fuel **business growth**, through a new more productive way
- There are many **less tangible benefits** – brand, value, consumer, productivity, safety
- Digital working will be the **new norm**
- **SME's are well positioned** to exploit BIM - integrated, OSM orientated & agile

Pilot outputs support the case for a site trial

BIM Models – 2D to 3D digital information

- BIM Components & System Libraries
- BIM Housing models
 - Argyle
 - Aversely
- Pilot learning gained to inform business case



2D “Dumb”
Auto-cad line
drawing +
manual
schedules &
specifications

3D Autodesk
Revit Intelligent
Digital Model
(embedded
information)

BIM – Supplier Readiness Audit

Ph1 Findings

- 50% did not respond (22/42)
- Less than 10% BIM Ready
- 32% are BIM Aware
- 58% not even BIM Aware
- Most are beginning to evaluate the technical aspects & supportive of the case

Conclusions

- Pace of change will be slow
- Supply chain need to be encouraged to change
- Supply chain opportunity for early adopters
- HBF BIM Accord being considered
- NHBC Industry readiness research

STEWART Milne GROUP		Managerial	Administration	Functional	Operation	Technical	Implementation	Supportive	Research & Dev.
SMG-1	C & W Berry Ltd	13%	0%	0%	0%	13%	0%	40%	14%
SMG-2	Deta Electrical Ltd	33%	4%	0%	0%	27%	0%	41%	14%
SMG-3	ENE Wall	40%	36%	40%	40%	63%	79%	57%	43%
SMG-4	Ig Doors Ltd	0%	0%	0%	0%	0%	0%	10%	14%
SMG-5	Kelvin Kbb Ltd	0%	4%	0%	0%	38%	0%	40%	14%
SMG-6	Kingspan	33%	3%	30%	20%	63%	43%	50%	43%
SMG-7	Lakes Bathrooms	0%	11%	0%	0%	0%	7%	0%	0%
SMG-8	Manrose	0%	3%	0%	0%	0%	0%	0%	0%
SMG-9	Marley	20%	9%	10%	0%	23%	7%	7%	36%
SMG-10	Marley Plumbing & Drainage	7%	9%	10%	0%	3%	36%	17%	29%
SMG-11	Mira	0%	0%	10%	17%	52%	21%	47%	14%
SMG-12	New View Window Systems Ltd	0%	9%	0%	13%	33%	43%	1%	0%
SMG-13	Quinn Building Products	22%	23%	0%	15%	54%	36%	39%	21%
SMG-14	Russell	40%	17%	30%	0%	15%	50%	30%	36%
SMG-15	Sandtoft/Wienerberger	100%	90%	90%	74%	75%	86%	64%	100%
SMG-16	Schneider Electric Ltd	90%	42%	47%	36%	75%	86%	64%	93%
SMG-17	Smeg UK	0%	0%	0%	0%	0%	0%	1%	0%
SMG-18	Sterling Precast	0%	0%	0%	0%	25%	0%	21%	14%
SMG-19	Stewart Milne Timber Systems	0%	3%	10%	11%	13%	0%	20%	14%
SMG-20	Stormking Plastics	0%	3%	10%	15%	31%	0%	47%	36%
SMG-21	Swish Building Products	0%	0%	10%	0%	0%	7%	41%	0%
SMG-22	Vitra	0%	0%	0%	0%	0%	0%	0%	0%

Legend

Low

Medium Low

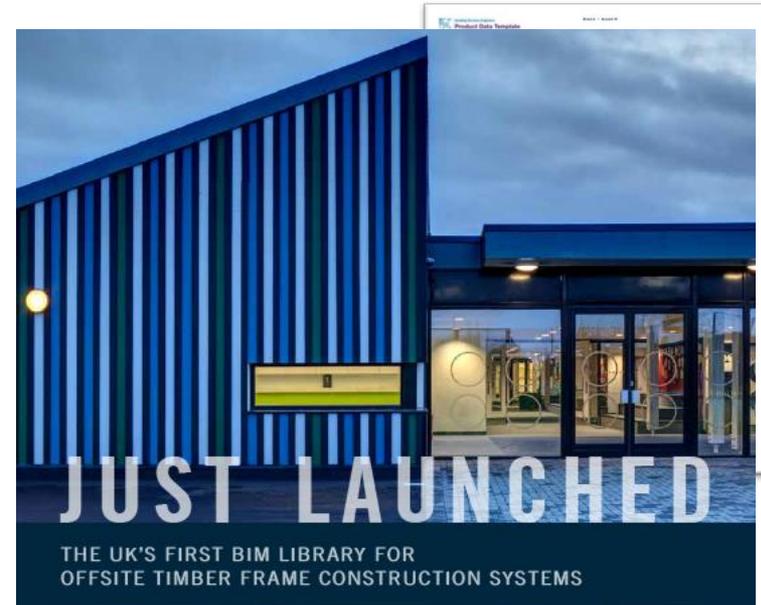
Medium

Medium High

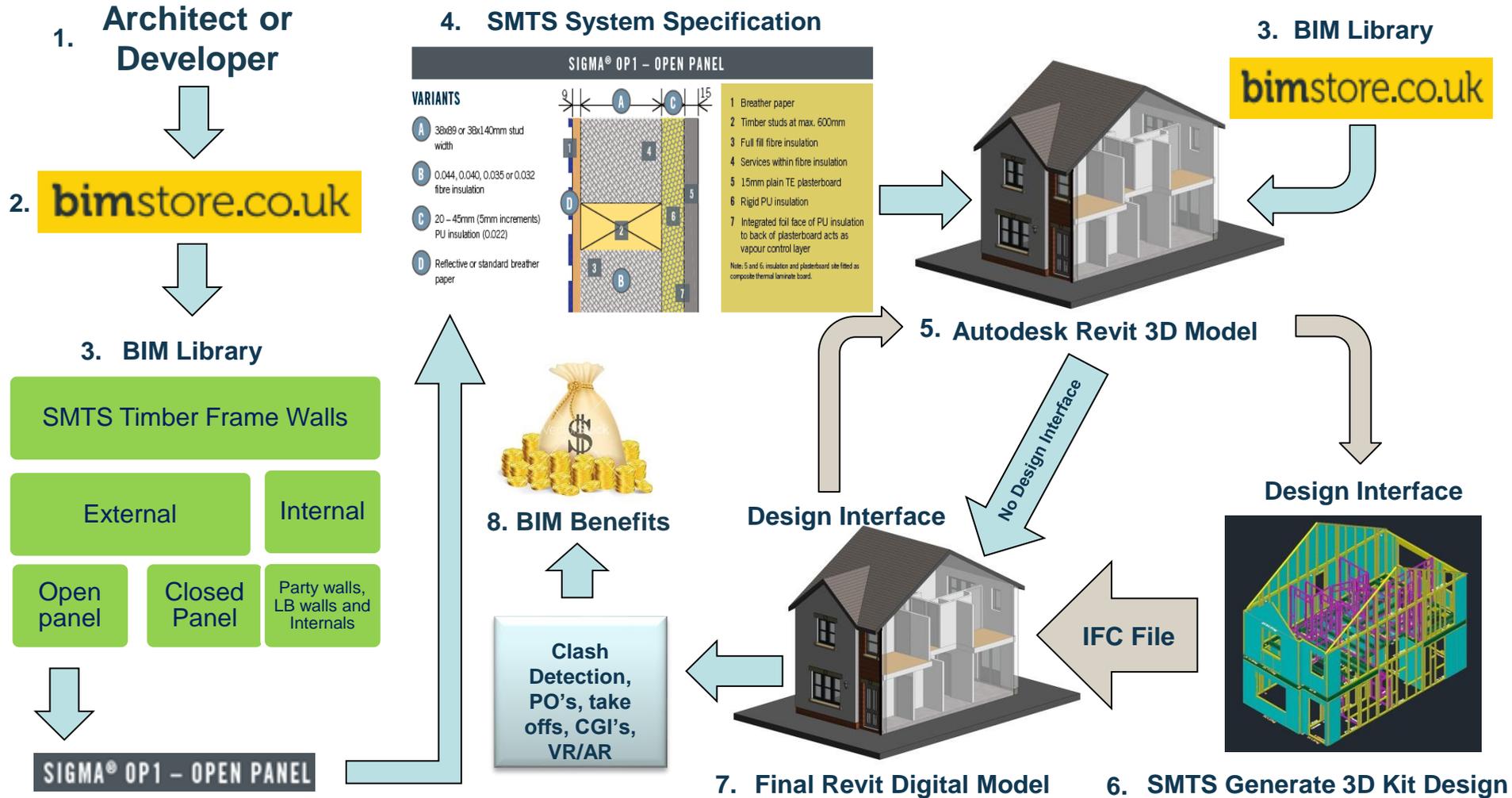
High

BIM TF Library Created (first of its kind)

- 1st Timber Frame BIM Library
- BIM Store – I-Tunes for BIM content
- 113 x TF Product Listings – walls, floors roofs
- Free to download Revit files
- Content is BS1192:4 & COBie Compliant
- Meet clients - BIM ER's & EP
- Product Data Templates & 2D sections
- Hi Level embedded Information
- Reduced lead time by 4 weeks
- Reduces cost of pre-design by 20%
- 12 hits a day



BIM Library – Fit in overall BIM process



BIM & OSM – Digitally Integrated



Our Goal

**Design, make, ship and erect
a structural shell, with
finished floors, fully insulated,
weather tight , fire safe &
secure in one visit, ideally
with no scaffolding & primary
services runs accommodated.**

BIM Enabled 3D Models - The Answer

Single Federated 3D Intelligent Model

- Embedded information
- Integrated external designs – services, kitchens, bathrooms
- Real time changes and visualization
- Library of 32 x 3D Woodlands models
- Platform to drive work flow change up and downstream of design
- Fast and efficient processing of changes and information, at the touch of a button:
 - Product improvements
 - Regulatory variants
 - Elevation variety and plot options
 - Site or Plot designs
 - Whole Street-scenes
 - Clash detection
 - Take offs and schedules
 - RFI's and site QA





Shift towards collaborative working, behaviors and values

Cultural Change – staff comments

“It’s the only way to go, we are falling behind”

“I’m very excited by the thought but worried about how it will change my role”

“It would improve my job and make life easier for me, it’s a no brainer”

I feel threatened by technology and scared by it all !

It’s the new way of the world, but I need training !!

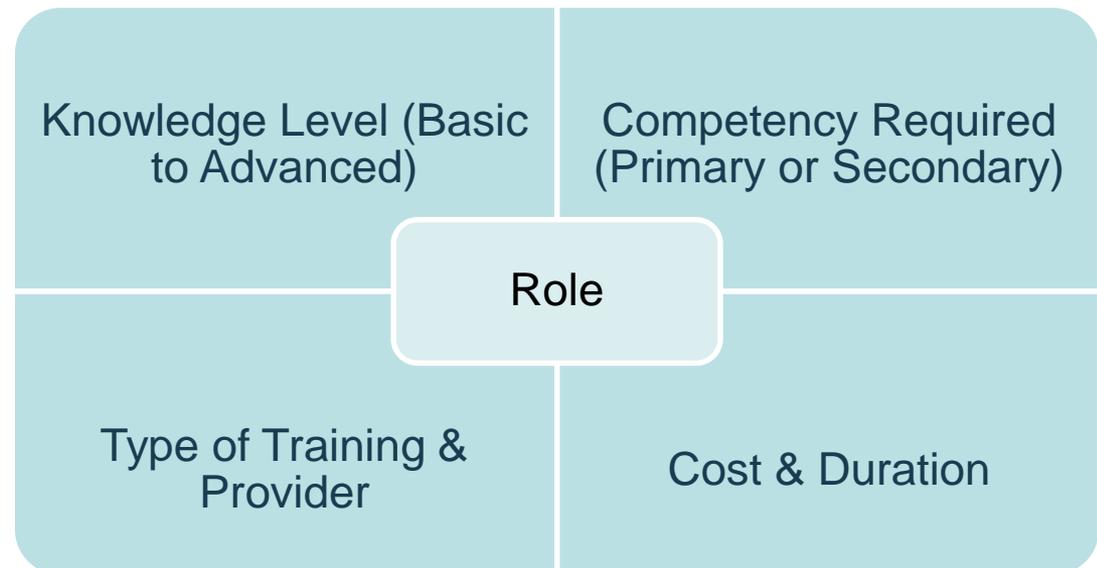
What’s in it for me, will I loose my job ?

“I’m not sure its good or bad thing, but I can see the benefits”

Training Plans – By Role

Created Training Plans for

- Senior Managers
- BIM Champions
- Technical Roles
 - Design, technical, commercial, procurement, estimating & construction
- Functional Roles
 - Finance, S&M & R&D
- Administrative/Support Roles
 - HSE, HR & IT



Cultural Change Plan

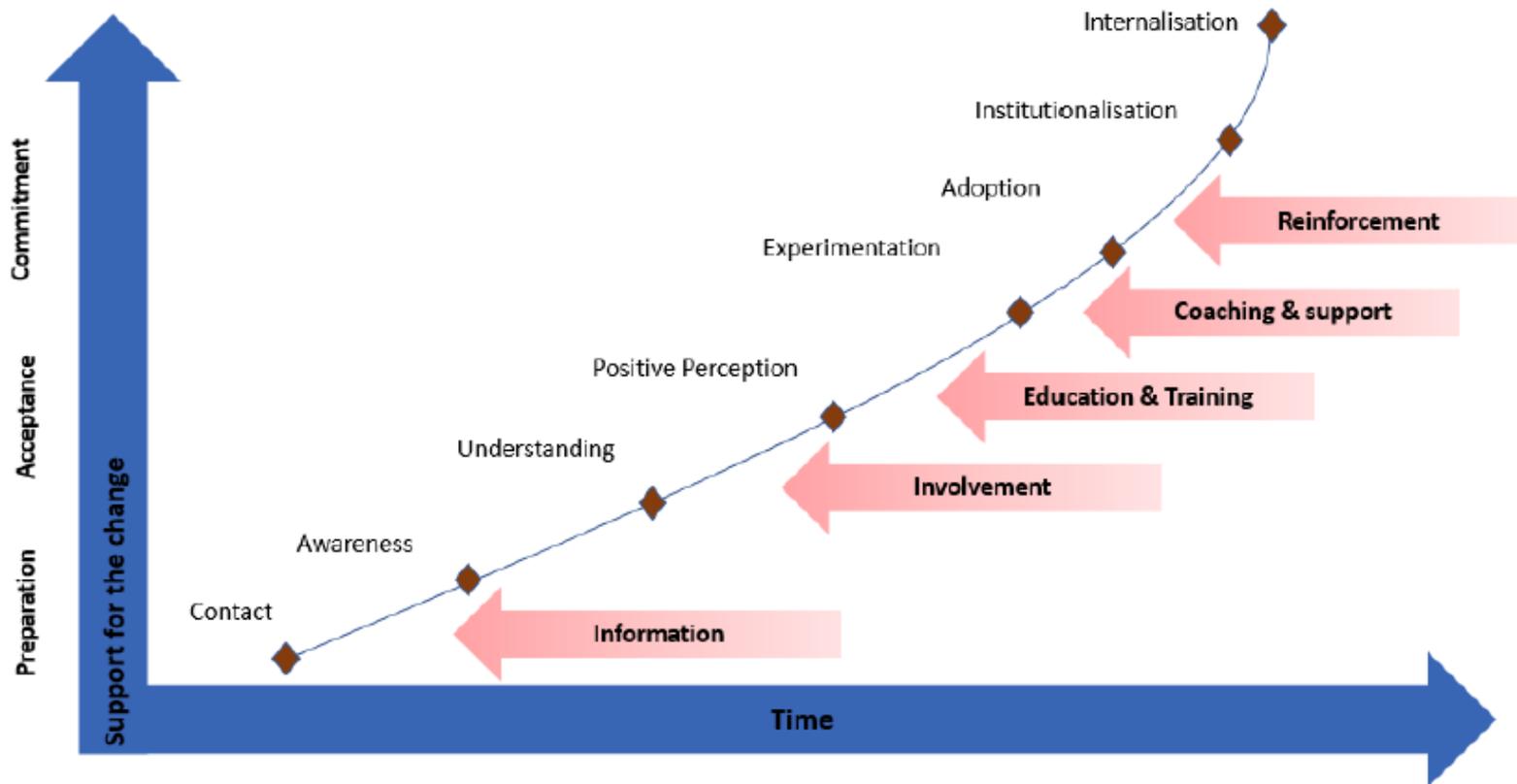
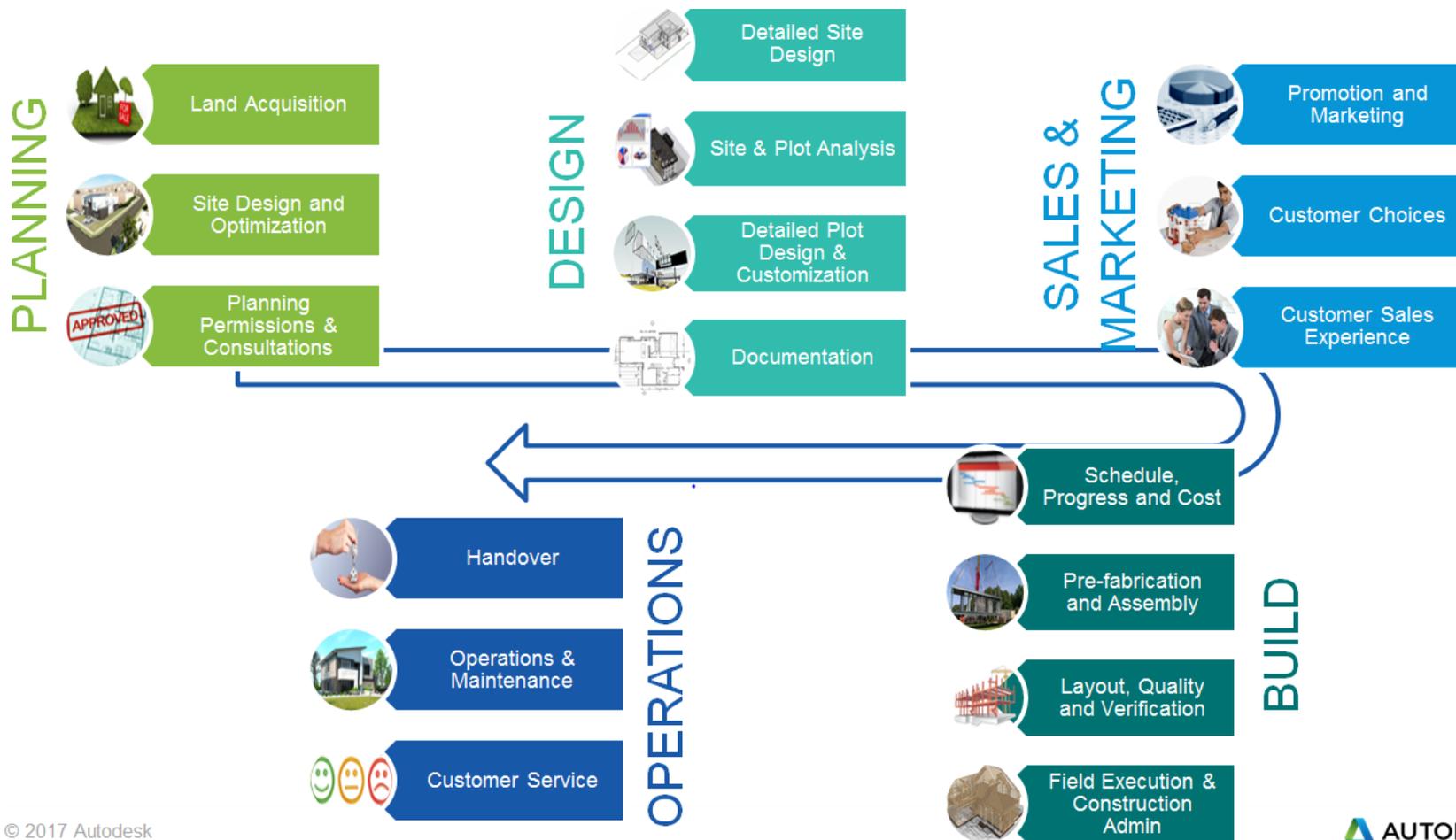


Figure 10. Mechanisms that can support the progression through the Eight Stages of Building Commitment Model

Business Case – The challenges



Business Case – What do we know?

 **Planning** approvals impact hugely

 **Build costs** are rising, **3-5% per year**

 **40 live sites**, remote from base

 **6%** cost sits in design **8%** in Sales & Marketing

 Sales rates is **0.84/week**

 **850** units in FY18 ramping to **1500** in FY21

 **32 House types** generate **87%** of our build

 **103 designers** in house

 **1000 hours** to build a 3 bed house **44%** of time is non-value adding

 **Skills** base is reducing and **labour cost** rising

 Customers want more + some **home personalisation**

 Average site is 100 units & its **1 a week** mind-set

 **5 *** Housebuilder (+90% score)

 **9 week** build programme (50% miss)

 **18 month cycle** for new product

 **1 in 4** homes are not completed on time

 **Design adds value** and we want to do more variation

 Cost of **quality** = £300 - £700 per unit

Business Case - A Choice for Growth ?

Option 1 – Remain 2D orientated

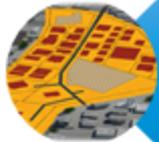
- Seek efficiencies, increasingly more difficult to unlock
- Curtail product variation, risk decline in business value
- Use existing systems, risk becoming outdated, unsupported and perpetuate inefficiencies
- Increase headcount, with limited productivity gain, profit per head reduces
- Risk market competitiveness & shareholder loss
- Offset losses elsewhere somehow

Option 2 – Move to 3D BIM enabled

- Seek and embrace new ways, invest in technology
- Maximize product variation, add business value
- Use new systems, fast improving updates and fully supported
- Limit headcount, secure productivity gains, increase profit per head
- Increase competitiveness & shareholder value
- Utilize gains elsewhere to supplement investment or add to profit gain



ROI – Where will it come from?



Land & Planning – Abnormal Costs, Public Consultations & Permissions



Design – Product Differentiation, RFI's and People Output



Build – Clash Prevention, Defects & Predictability



Sales & Marketing – Sales Rate & Marketing Material



Customer Care – Enhanced customer experience pre and post handover & digital service agreement

ROI – Business Case “£’s”

Planning

Design

Sales

Construction

Customer Care



£600 plot
saving

£800 plot
saving

£1350 plot
saving

£750 plot
saving

Value from
Happy
Customers
& Brand
Excellence

£3,500 saving per plot

£3m (850 homes) - £5.6m (1,600 homes) per year

+ Intangibles: productivity, quality, staff, safety, culture

ROI – Business Case “£’s”

Planning

Design

Sales

Construction

Customer Care



- Reduce planning cycle by 30%
- 50% increase in the likelihood of securing planning
- 25% increased support for community consultations
- 100% sites consented in Y1
- £600/plot saving in cost securing planning



- £500/plot saving in abnormal costs through 3D land design
- 30% reduction in site architectural design time
- 35% productivity gain for technical users
- £300/plot saving in RFI



- £250/plot saving in marketing costs
- 20% increase in sales rates 0.84/week to 1.1/week
- £600/plot saving in development finance costs
- Move towards a build to order business model
- £500/plot premium for early sales interaction & home personalization



- £250/plot saving in defects and snagging
- 20% increase in handovers on time
- £350/plot saving in cost of missed handovers & NHBC resolutions
- £150/plot saving in reworks and making good, due to early clash detection
- 30% improvement in safety performance



- 30% increase in recommendations and referrals, retention of 5 *
- OTIF handovers & digital move in packs & aftercare
- Higher likelihood of customers buying off plan
- Brand differentiation due to visualization and potential personalization
- Potential for early deposits, easing cash flow

Business Case - Pro's and Con's

Upsides

- Faster planning consents
- More accurate costs
- Optimized high quality site design
- Premium prices
- Faster sales rate
- Build to order construction
- Fewer defects, improved quality
- Less RFI's, duplication and reworking
- More productive people & integrated teams
- Collaborative working, internal & external
- Less paperwork, and NVA processes
- Better customer experience
- Brand Differentiation
- Improved ROCE

Downsides

- Creating the generic & plot models
- Buy-in of people, team & business
- Up-skilling & Training
- Operating in CDE environment
- Change, uncertainty & risk
- Unintended consequences
- Things become difficult
- Fear of failure/unknown & loss of control
- Leadership
- Cultures and behaviors
- Super users and critical roles
- BIM protocols & execution plan
- Supply Chain readiness
- Sub contractor interfaces
- Site ICT & field capability

Recommendation - Trial Project : Why?

- Emerging, inevitable and **compelling case** for BIM
- **Measure & validate** business benefits in pilot (or not)... with real data and examples !
- Gain valuable **learning** from real users, staff feedback & process change points
- Assess **interfaces with other business systems** – Axapta, Anaplan, Consultec
- Stimulate supply chain to integrate & work with us
- Develop fully federated models, **understand pitfalls & best bits**
- Test and challenge new sales tools with real customers & marketplace
- Raise awareness and **secure buy-in for change** from business
- Breed super users and advocates, refine training tools and systems
- Get things wrong, in safe and controlled way, **de-risk implementation**
- Inform Ph3 – business case for unilateral roll-out across group
- Platform to facilitate **corporate and strategic** development

Pilot Study – The Business Case for BIM (SME's)

- Digital working has potential for **£3,500** saving per plot, but needs validation
- Savings could be **£3m** per year
- Digital working will fuel **business growth**, through a new more productive way
- There are many **intangible benefits** – brand, value, consumer, productivity, safety
- Digital working will be the **new norm**
- **SME's are well positioned** to exploit BIM - integrated, OSM orientated & agile

Pilot outputs support the case for a site trial to validate benefits (or not)