

Truly Yours?

# MASS CUSTOMIZATION THROUGH ADDITIVE MANUFACTURING

## **CADANS SEMINAR**

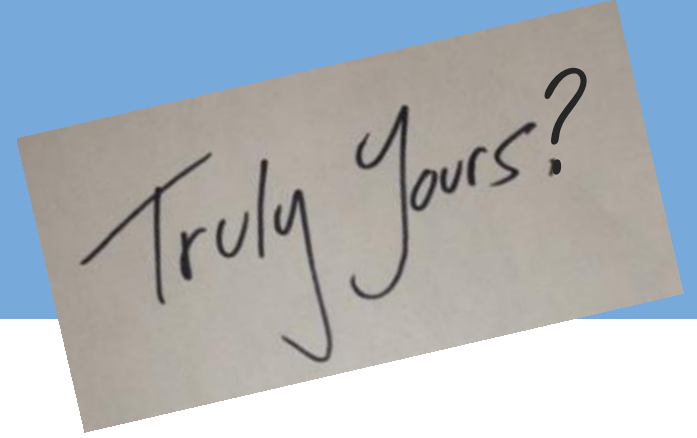
Antwerp – June 2nd 2015

Tom Peeters – Sales & Marketing RS Print



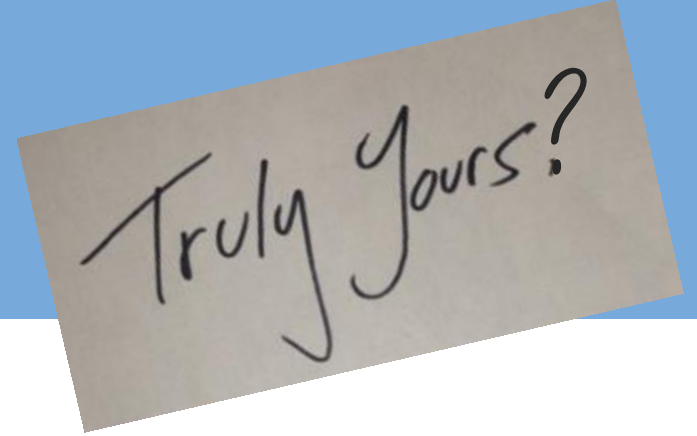
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# MASS CUSTOMIZATION THROUGH ADDITIVE MANUFACTURING



- 1) Customization versus fitting – impact on production processes
- 2) Added value of additive manufacturing for mass production?
- 3) Threats & opportunities for existing industries and AM
- 4) Expert knowledge in a 3D-printing environment

# MASS CUSTOMIZATION THROUGH ADDITIVE MANUFACTURING



- 1) **Customization versus fitting – impact on production processes**
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# 1) Custom versus fit

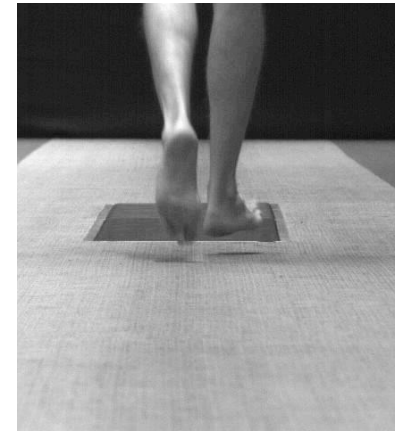
**Analysis/measurement: digital + individual for custom and fit**

## footscan®

- Digital analysis (pressure plates)
- High quality dynamic gait analysis, every step is different

## Solution?

- Patient's needs?
  - Comfort/injuries/pathologies/performance/prevention?
- Price?
- Expert's belief & knowledge?



**custom  
vs. fit**

AM's added  
value

Threats &  
opportunities

Experts'  
role



# Fit solution

- Matching an existing product to the individual analysis in the best possible way => start off the shelf & make small adaptations
- Low labor intensity for the skilled professional
- Mass production (S/M/XL => shore values, thickness, pronation/supination)
- Fast (+)
- Relatively cheap
- Easy to replace



# Custom solution

- Create an individualized solution for the analysis (+)
- More expensive (-)
- Intense and skilled labor (-)
- Lead times (-)
- Unique product (+)
- Difficult to replace (-)



# Custom versus fit paradox in contemporary podiatry (US/UK)

## Custom

- Outsourcing of design & production
  - data/analysis transfer
  - no expert control on the orthotics' design
- Market concentration  $\leftrightarrow$  unique products
- Mass production through cad cam system (non durable, though easy reproduction)
- **Decreasing expert/healthcare specialist control over the end product**

## Fit

- Expert 'owns' data
- Wide range of possibilities
- Small adaptations are more labor intensive than with bespoke solutions
- **Solution based upon expert's knowledge!**

custom  
vs. fit

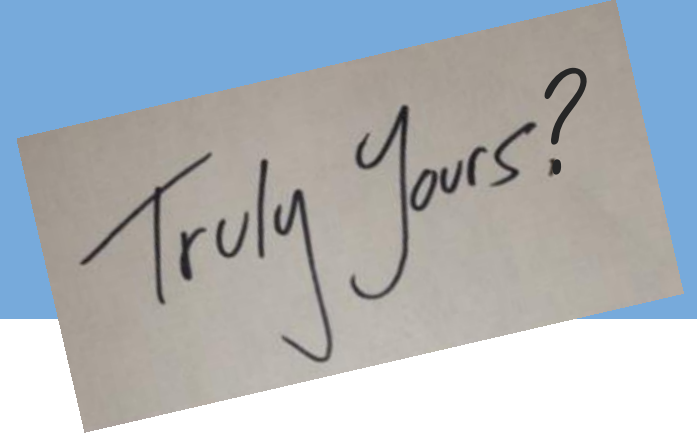
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## 2) Added value of Additive Manufacturing

**Personal**

Functional  
Customization

**Activity**

**Footwear**

custom vs.  
fit

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## Flashback - Custom solution

- Create an individualized solution for the analysis (+)
  - More expensive (-)
  - Intense and skilled labor (-)
  - Lead times (-)
  - Unique product (+)
  - Difficult to replace (-)
- ✓ Check!
  - ✓ Prices will lower...
  - ✓ Only skilled labor
  - ✓ Will decrease...
  - ✓ Check!
  - ✓ Easy reproduction!

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# Downsides of the custom versus fit paradox

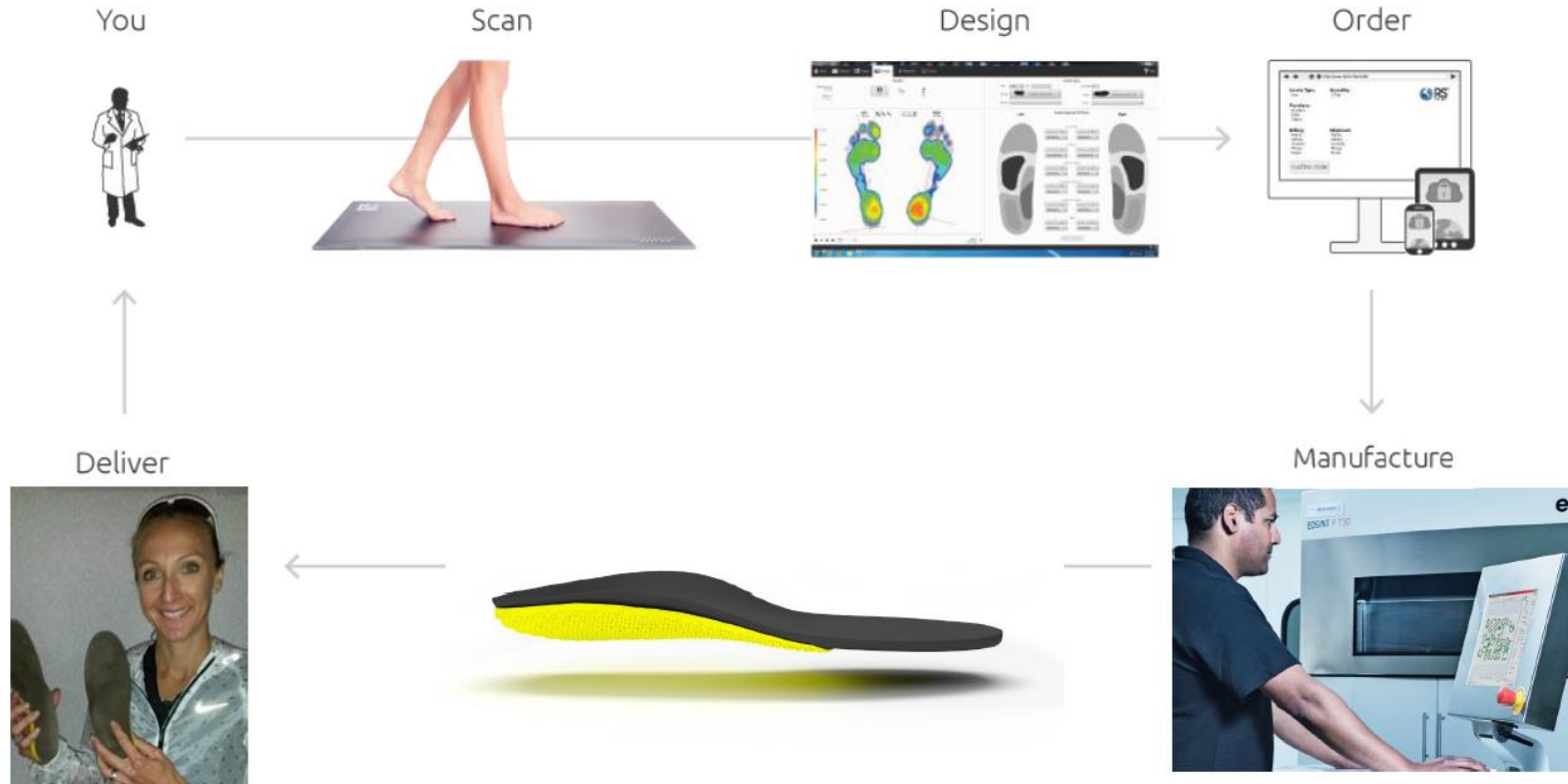
- Outsourcing of design & production
  - data/analysis transfer
  - **no expert control on the orthotics' design (!)**
- Market concentration  $\leftrightarrow$  unique products
- Mass production through cad cam system (**non durable**, though easy reproduction)
- **Decreasing expert/healthcare specialist control over the end product**

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## From 2D dynamic footscan® to 3D printed dynamic insole

custom vs.  
fit

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**Additive manufacturing?**

**Seems great! But is proven effective?**

**Some case studies!**

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**PHONAK**

life is on

**Data  
Conditioning**

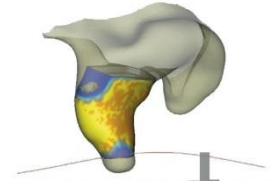
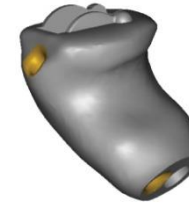
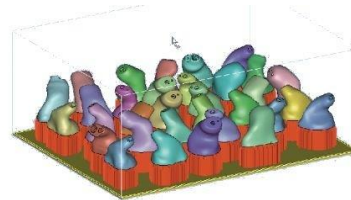
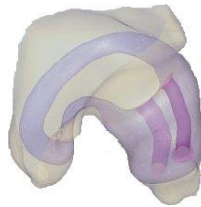
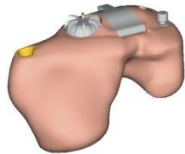
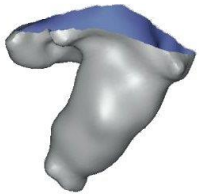
**Design**

**Engineering**

**Work  
preparation**

**Production**

**Delivery**



**3D scan to manufactured hearing aid**

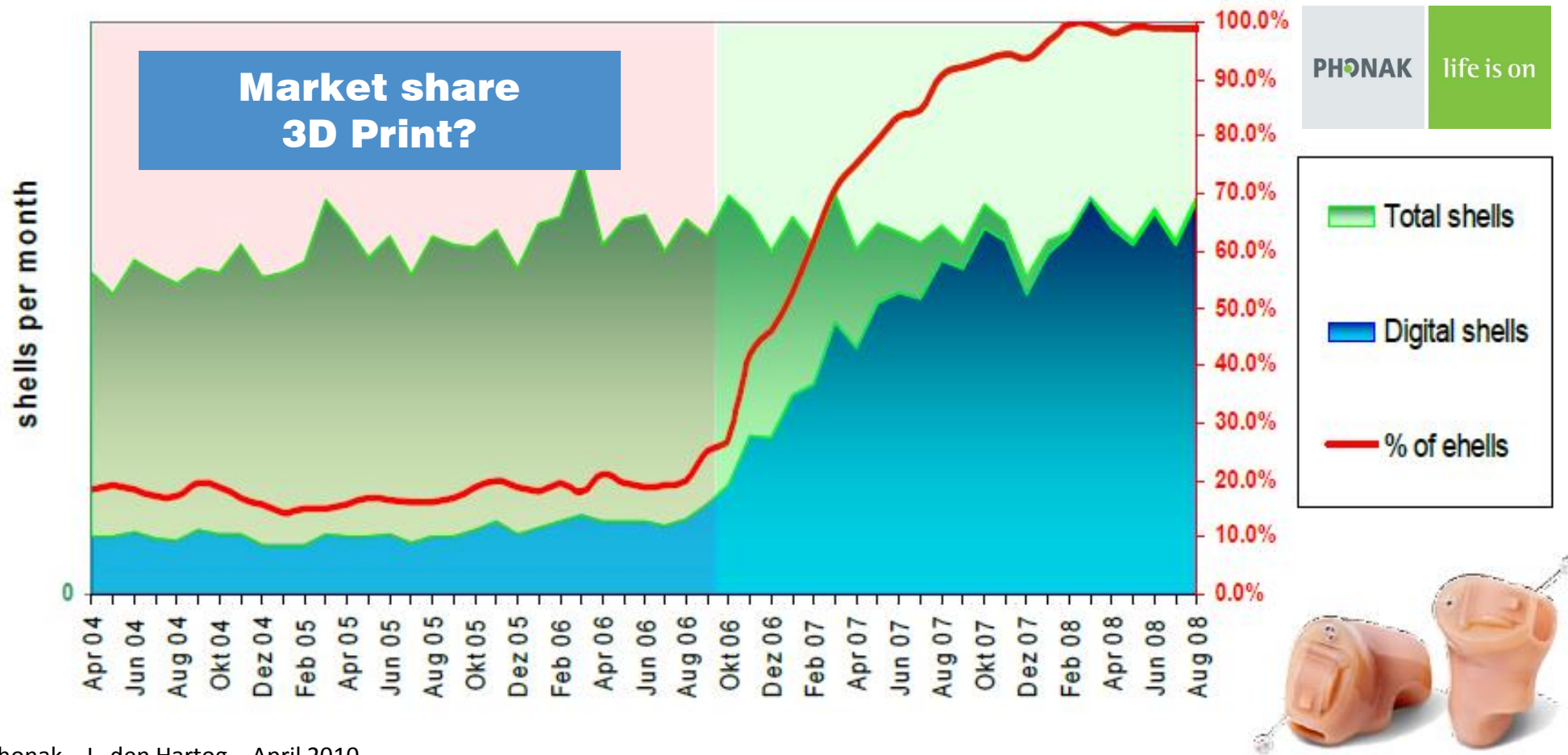
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Phonak – L. den Hartog – April 2010

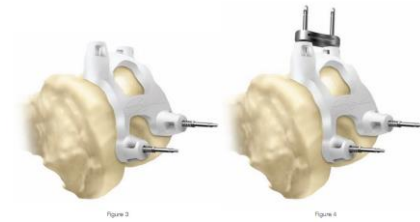
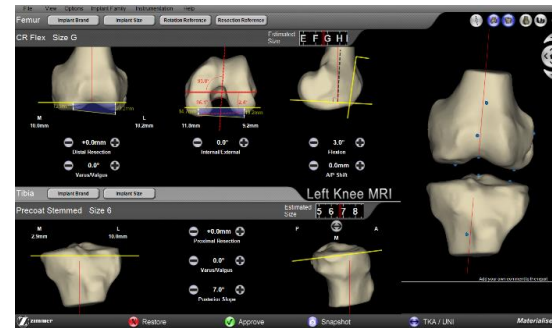


**CT / MRI  
scan**

**2D  
Cross  
Sections**

**Design**

**Surgery  
drilling  
guide**



custom vs.  
fit

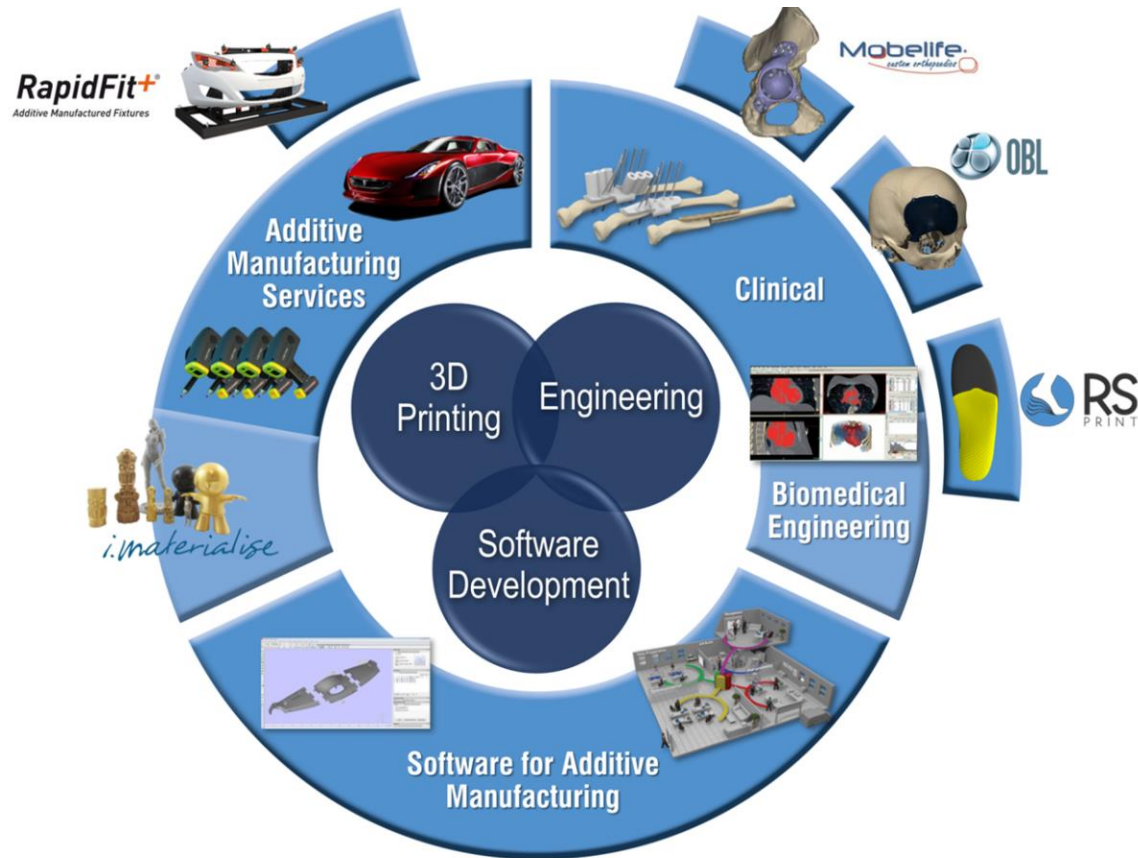
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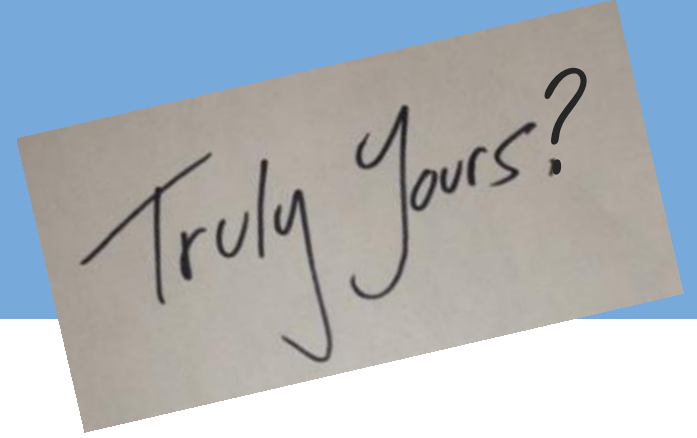
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# 3) Threats and opportunities for existing industries and for additive manufacturing

## Threats for existing industries...

- New competitors, new experts
  - 1st line service comes into play
- New technologies, new insights in their expertise domain (cfr. cadcam technology early 21st century)
- Different recruitment within existing industries

custom vs.  
fit

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## Opportunities for existing industries (healthcare specialists)

- Rethink the service level, more time for analysis/diagnosis
- Regain expert knowledge on design
- Durable products
- Increase efficiency
- New healthcare specialists

custom vs.  
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## Threats for additive manufacturing...

- Protectionism/conservatism within certain markets (podiatry)
- End consumers' expectations
- Return on investment?
- Too accessible in the future?
- Cowboys on the market

custom vs.  
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## Opportunities for additive manufacturing

- New competitors, new experts
  - 1st line service comes into play (physiotherapist, doctors, retail)
- New customers! E.g. performance driven, not only medical
- Durable production
- Scalability => customize on large scale, based on external designs

custom vs.  
fit

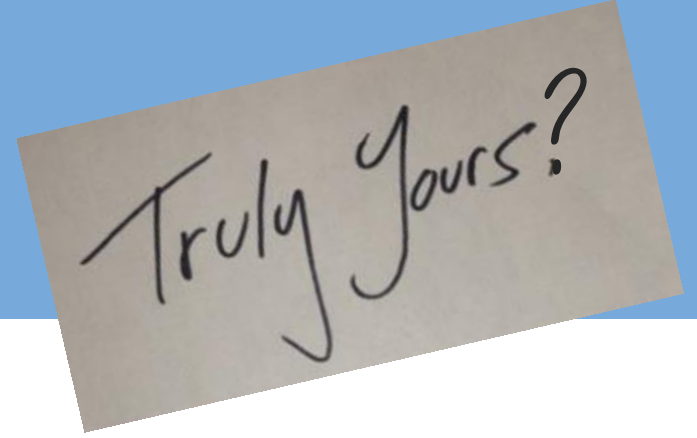
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# 4) Expert knowledge

## Different types of experts

- « **Front End Expert** »: e.g. healthcare specialist (surgeons, podiatrists, opticians, audiologists...)
- « **Back End Expert** »: engineers, software developers, production units  
=> **Clinical Engineering™**

**Achieve joint expertise!**

custom vs.  
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**role**



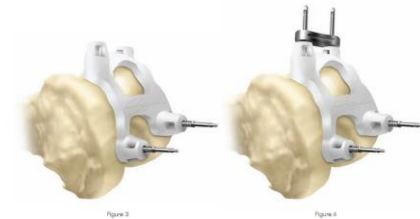
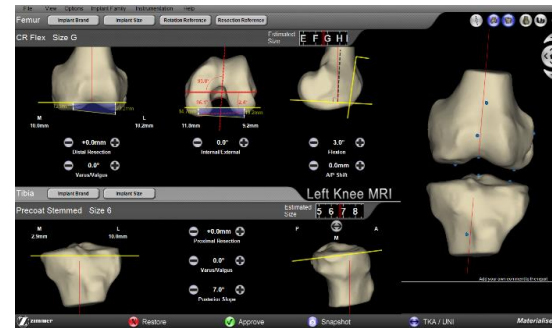
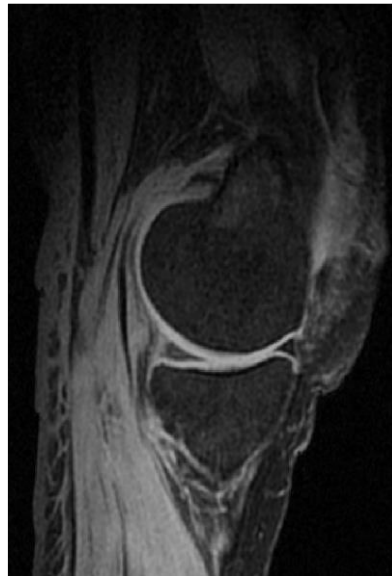


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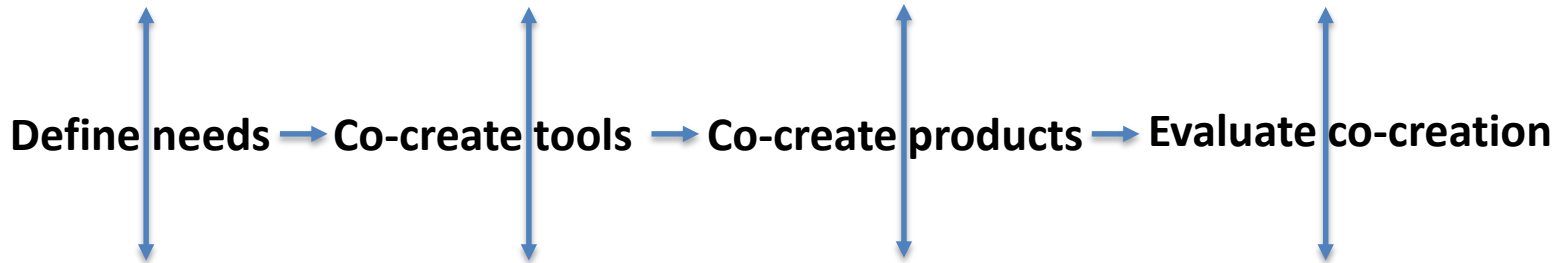
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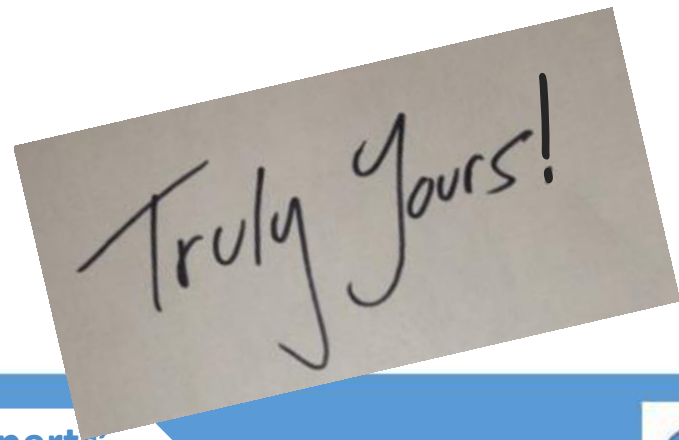


## « Front End Expert »



## Clinical Engineering™

... make it



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# QUESTION TIME



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THANK YOU!



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