

## Enterprising Researchers



**A workshop for early career research staff and postgraduate research students on developing enterprise skills**

**Monday 14 October 2013, 14:00-16:00 in Aspect Court-15202**

This workshop aims to inspire enterprising researchers and highlight the support available to them in this area. In particular it will:

- Showcase successful enterprise activities/projects undertaken by SHU researchers
- Highlight ways the University supports its researchers to become more enterprising
- Introduce the concept of transferring knowledge from research to the market
- Explore different business models and aspects of the commercialisation of research
- Help researchers realise the transferable potential of their research skills and the career prospects for enterprising researchers in both academia and industry
- Identify what skills researchers need to initiate enterprise projects

Enterprise is about looking outwards, beyond the confines of narrow disciplines. The cutting edge of research is on the boundaries, where new knowledge can be applied and utilised widely for the benefit of society.

This event will include presentations from members of SHU's research community, who will share their enterprising journeys.

### **Who should attend?**

The workshop is aimed at early career research staff (ECRs) and postgraduate research students (PGRs) who are interested in the enterprise potential of research and the support available to researchers at the University. It will be suitable for individuals from all disciplines, although it is aimed more at those with little or no knowledge/experience of the area of research enterprise.

**The workshop's programme is outlined overleaf**

## PROGRAMME

Time	Item	Lead
14.00– 14.05	Welcome	<b>Keith Fildes</b>
14.05– 14.30	<b>Entrepreneurial Research</b> Case study	<b>Patricia Dieng</b>
14.30– 14.55	<b>Supporting Entrepreneurship</b> Information session	<b>Sheila Quairney</b>
14.55– 15.20	<b>Commercialising Research</b> Case study	<b>Hywel Jones</b>
15.20– 15.45	<b>Supporting Commercialisation</b> Information session	<b>Rob Evans and Graham Hulse</b>
15.45– 15.55	<b>The Role of Design in Transferring Knowledge from Research to the Market</b>	<b>Heath Reed</b>
15.55– 16.00	Questions to panel	

### About the speakers

**Patricia Dieng** is Director of TacMap, a company she founded whilst working as a design researcher in C3RI. TacMap is a navigation system which enables visually impaired people to find their way around indoor spaces

**Dr Hywel Jones** is a Principal Researcher in MERI and Chief Scientific Officer of XeraCarb. He has commercialised aspects of his research on ceramics and ceramic composites, including use in lightweight body armour materials

**Heath Reed** is Principal Industrial Designer and Senior Design Researcher in C3RI. He works to support the conversion of research to market through design principles and practice

**Sheila Quairney** is Business and Enterprise Manager in the Research and Innovation Office

**Rob Evans** is Technology Transfer Manager in the Research and Innovation Office

**Graham Hulse** is IP and Commercial Contracts Manager in the Research and Innovation Office

**Dr Keith Fildes** is Researcher Development Adviser in the Research and Innovation Office

### Booking

Reserve your place at this workshop by going to: <http://shuenterprisingresearchers.eventbrite.co.uk>.

You do not need to print out the ticket generated through your booking.

# TACMAP<sup>TM</sup>

THE WORLD AT YOUR FINGER TIPS



**To make spaces accessible to visually impaired people**

**L'école de design**  
NANTES ATLANTIQUE

**Sheffield  
Hallam  
University**



**TACMAP**<sup>TM</sup>  
THE WORLD AT YOUR FINGER TIPS

**Sheffield  
Hallam  
University**

 Sheffield  
Institute of Arts  
AT SHEFFIELD HALLAM UNIVERSITY

 LAB 4 LIVING

  
SRSB  
Sheffield Royal Society for the Blind

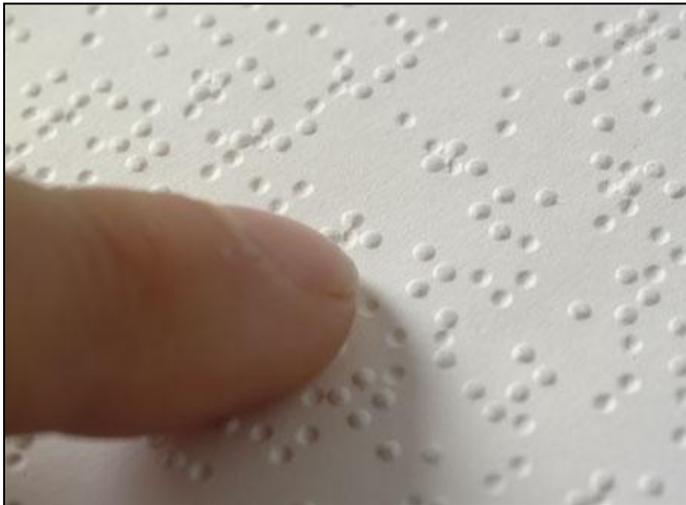
**Zychem**



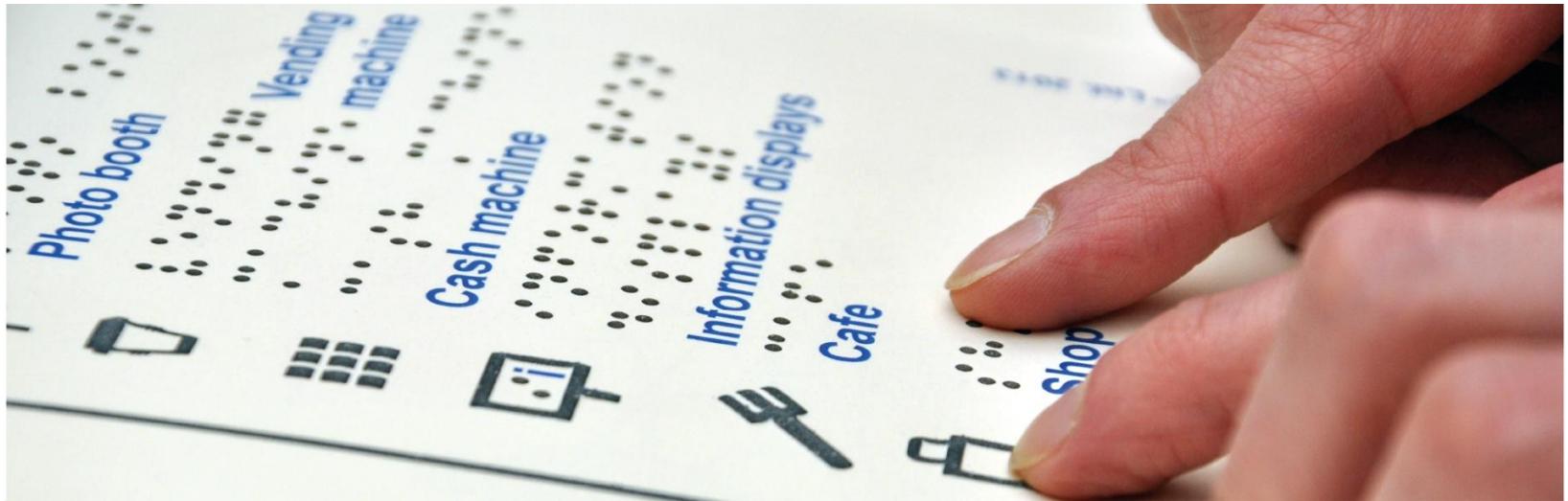
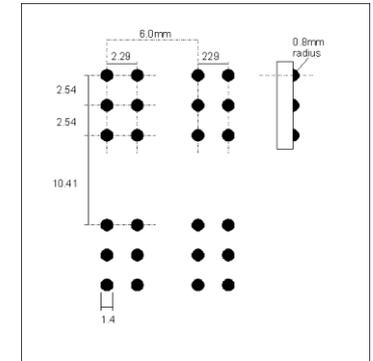
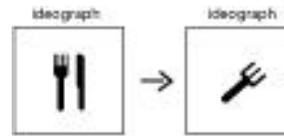
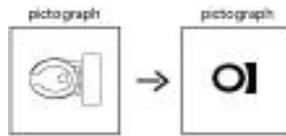
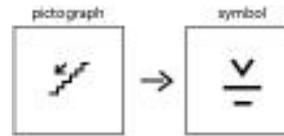
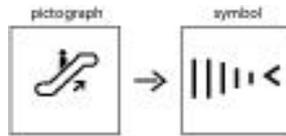
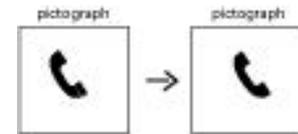
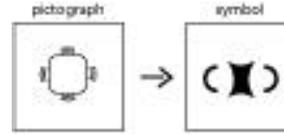
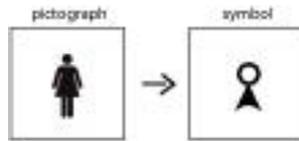
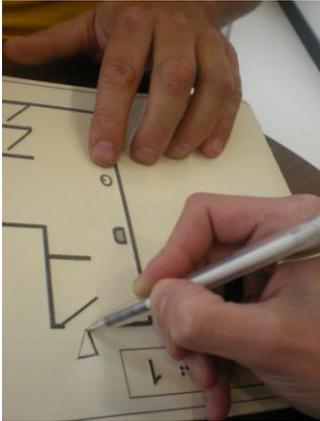
**Sheffield  
Hallam  
University** | Art and Design  
Research  
Centre

## TacMap users/ needs

- 2m blind and partially sighted people in UK
- 160m over 177 countries (WBU)
- 4m blind and partially sighted people in UK by 2050 (RNIB) because we are living longer
- Niche market?





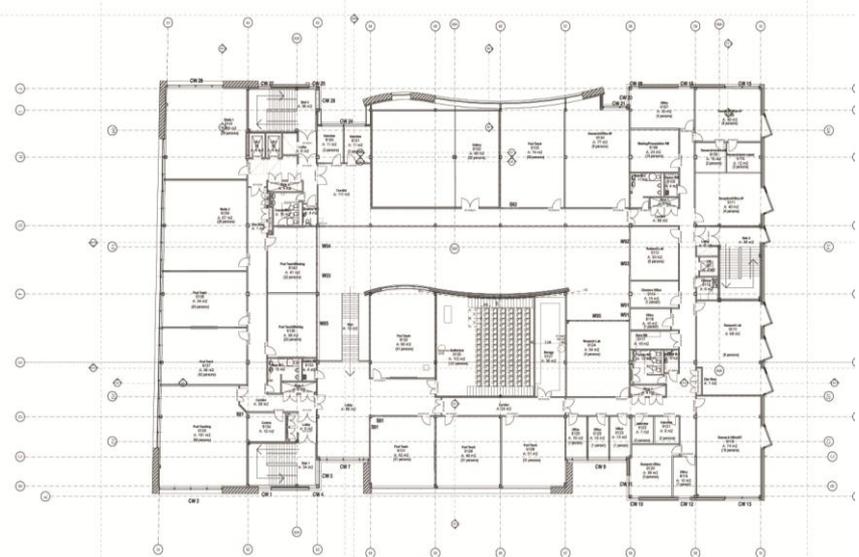




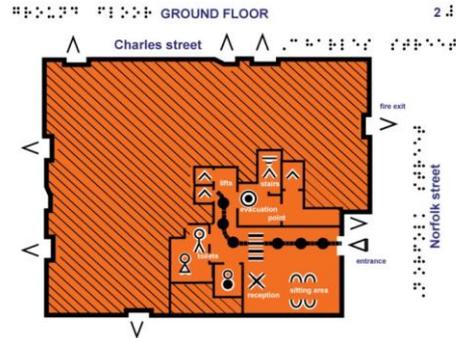
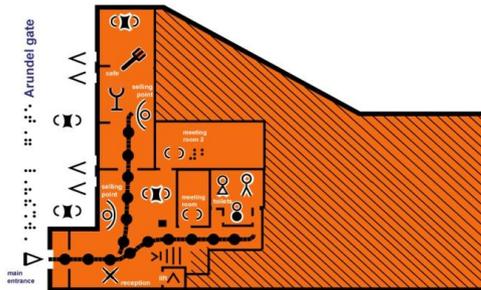
**TacMap™** is a navigation system which has been designed to enable visually impaired people to find their way around indoor spaces.



# Trials



LOWER GROUND FLOOR 2:1



Our task is to translate complex architectural plans into a **TacMap™** version using tactile symbols, textures, Large print and Braille abbreviation.

main  
entrance

toilets



# ME, Entrepreneur?



# TACMAP<sup>TM</sup>

THE WORLD AT YOUR FINGER TIPS



**Risks?**

**What support  
can I get?**

**Can I create my  
own business?**



**From Sheffield  
Hallam University?**



## Research and Innovation Office



- Free office space, 12 months
  - Proof of concept: £500
  - Graduate start-up Scheme: £200/months
- Business workshops**  
**One to one meeting with experts whenever you need it**

## Many questions I needed answers to Decisions to make



-Limited Company?

-IP?

-Insurance?

-Terms and conditions?

-Right business model?

-Fixe my prices?

-Who's going to pay for this product?

-How will it be made available to users?

-VAT Registered?

-PR?

-Networking events?

-Marketing?

# Sheffield Hallam University

## ENTREPRENEURS BOOT CAMP

2<sup>nd</sup> – 5<sup>th</sup> July 2012

### Enterprise Challenge 2012

*Translate your business idea  
into success*

*All you need is a sentence.  
And you could win £5,000.*



Idea 82



## BUSINESS-PLAN



**TACMAP**<sup>TM</sup>  
THE WORLD AT YOUR FINGER TIPS

Sheffield  
Hallam  
University

Sheffield  
Institute of Arts  
AT SHEFFIELD HALLAM UNIVERSITY

LAB 4 LIVING

SRSB  
Sheffield Royal Society for the Blind

Zychem



C C C A- A+ Find a TacMap

Home About TacMap Our process Contact



Many people already use TacMap. Here are some of them.



### What we do

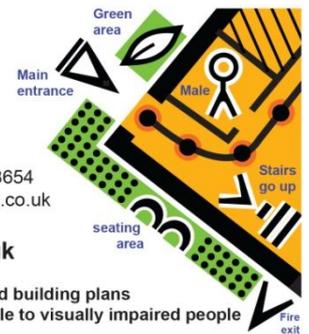
TacMap™ is a navigation system which enables blind and partially sighted people to find their way around indoor and outdoor spaces enriching their everyday life. Our tactile maps are designed to give essential information in a society where most of the signage is visual. TacMap provides equal opportunities for visually impaired people and allows them to use the facilities within a venue with more confidence and extra safety. TacMap helps building managers and businesses fulfil their duty and the equality act 2010/disability discrimination act, which looks after inclusive communities.

**Patricia Dieng**  
 Director

Mob: +44 (0)754 042 8654  
 Email: patricia@tacmap.co.uk

[www.tacmap.co.uk](http://www.tacmap.co.uk)

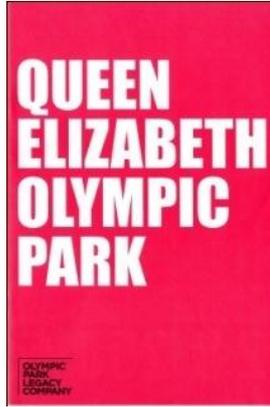
Portable tactile maps and building plans  
 Making spaces accessible to visually impaired people





*Holiday Inn*

- Improve health and safety performance
- Satisfy their duty under the DDA



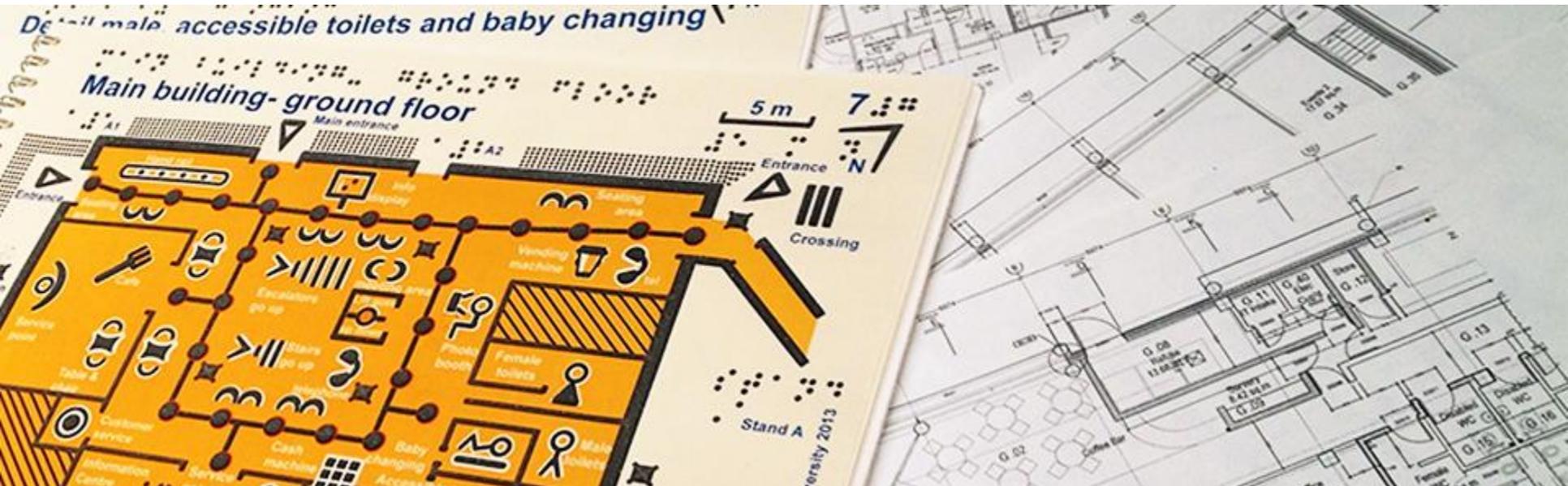
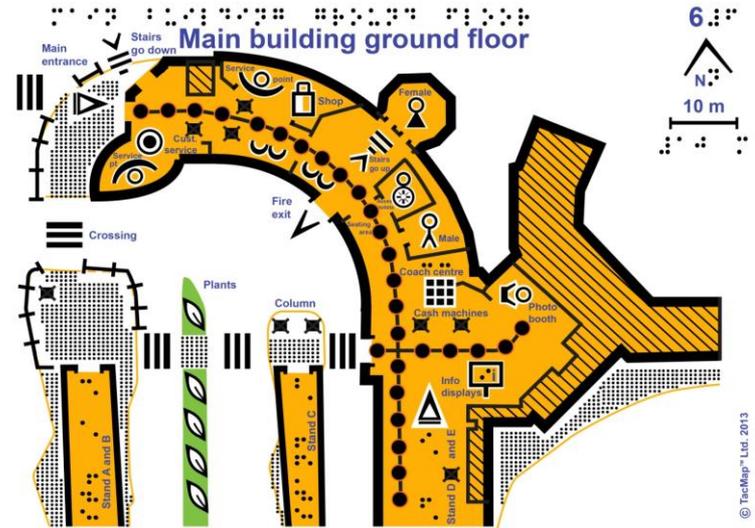




***DESCRIBE ONLINE Ltd.***

**isgroup**  
brand.design.sign







# Entrepreneur & Researcher



- ✓ -Good at project management
- ✓ -Good at handling budgets
- ✓ -Managing a team
- ✓ -Handling Data
  
- ✓ -Innovative
- ✓ -Information-seeking
- ✓ -Demand for quality
- ✓ -Self-motivated: I am on my own, of course with an incredible family that supports me, and friend and also friends entrepreneurs, but in definitive I am on my own, if I don't take the phone, don't send emails, nothing will happen
- ✓ -Patient: my first contract, 9 months, you think that a project will be sign with a client but in definitive between the time they show their interest and the time you receive the order...
- ✓ -Risk-taker, First year more outcomes than incomes
- ✓ -Ability to get along with people: I am a shy person, but it doesn't goes with the fact to be a business woman
- ✓ -Totally committed  
Result-orientated



-Trading an experimental design for a business plan is not for everyone.

-The choice requires a careful examination of one's self and one's technology.

-It also requires learning a new language.

-If you decide you and your business idea are ready, you have the potential to experience the satisfaction of seeing what you have developed meet a market need by getting it into the hands of the public.





Thank you

[patricia@tacmap.co.uk](mailto:patricia@tacmap.co.uk)

[www.tacmap.co.uk](http://www.tacmap.co.uk)



**Enterprise and Entrepreneurship**

*How the University can help you to take your ideas forward*

*Sheila Quairney  
Business and Enterprise Manager,  
RIO*





You are Enterprising!

*If you conduct research, undertake academic development, or seek funding, then you can:*

- *Communicate across different mediums*
- *Work effectively in teams and lead groups*
- *Critically seek and evaluate commercial information*
- *Spot opportunities and develop them systematically*
- *Understand the importance of innovation to business success*
- *Possess the knowledge and skills to support it*

Monitor Competitors.

Create Opportunity.



## What are the benefits of self employment?

- *Be in control of your own destiny/make your own decisions*
- *Choose your own customers*
- *Flexible working hours*
- *Be recognised for your work - real job satisfaction*
- *Keep all the profits!*
- *No-one would want to employ you!*



...and what is the downside?

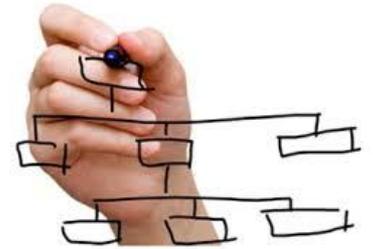
- *Long hours*
- *Irregular income*
- *No holiday pay or sick pay*
- *Paperwork and book-keeping*
- *Dealing with tricky customers*
- *Pressure of making all the decisions*
- *Not having workmates around you*



## What personal qualities will you need?

- *Determination*
- *Resilience*
- *Be good at what you do*
- *Take pride in what you do*
- *Self belief*
- *Time management skills*
- *Organisation*
- *Put the customer first*

Dedication **Tenacity**  
Keep-Going  
Don't-Quit  
Inspiration  
Fortitude  
Endurance  
Perseverance  
Determination  
Motivation





So where do you start?

*We can help you to take those first steps.....*

- *Do your research - customers, competitors*
- *Look at the numbers to see if it's viable*
- *Identify the sources of funding you need*
- *Choose a business structure*
- *Check out other legal issues eg insurance*
- *Write (or draw) your plan*
- *Test the market*
- *Do it*



## How can RIO help you?

*You are not on your own - free support to all students and recent graduates*

- *1:1 meetings with professional business advisers*
- *Free office space - The Hatchery @ the Workstation*
- *Grants and funding - pre start and trading*
- *Workshops throughout the year*
- *Networking events*
- *Access to SHU workshop space*
- *Annual competition - Enterprise Challenge*
- *Signposting to other sources of help eg SENTA*
- *Support for international graduates - Tier 1 Graduate Entrepreneur Visa scheme*
- *Staff offer - talk to us*



**Interested...?**

*No matter what stage you are at....*

*...we want to help you*

*Telephone - 0114 225 3131*

*E-mail - [enterprise@shu.ac.uk](mailto:enterprise@shu.ac.uk)*

*Website - [www.shu.ac.uk/startup](http://www.shu.ac.uk/startup)*

*Twitter - @EnterpriseSHU*



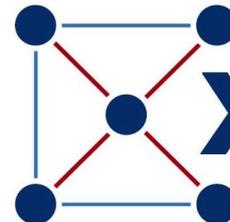
# Commercialising Research: An Academic's Perspective

Dr Hywel Jones

Principal Researcher, MERI  
Chief Scientific Officer, XeraCarb

**Sheffield  
Hallam  
University**

Materials and  
Engineering  
Research Institute



**XeraCarb**

# My Background



## University of Warwick

88-91 Physics BSc

92-93 MSc Materials Characterisation

93-97 PhD **SiAlON Ceramic Composites**

1997-2000 PDRA **Ultrahard Ceramics**



## Sheffield Hallam University – MERI

2000 MRI, Research & Consultancy

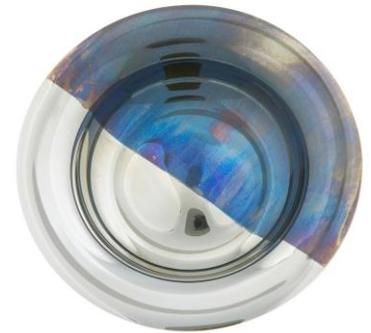
2004 MRI, Senior Res/Consult

2009 MERI, Knowledge Transfer Champion

2011 Director and CSO of XeraCarb Ltd

# Commercialization Experiences

- Anti-Tarnish Silver, 2003-2007
  - EU FP5 programme with 6 partners
  - Royalty deal with local manufacturer



- Ceramic Armour 2008-2013
  - Internal and MOD funded with external partner
  - Spinout company



# Light Weight Ceramic Armour

- Ancient art
- Ballistic protection only since late 19<sup>th</sup> C
- Ceramics since 1990s



# An Armour System



14kg/31lbs



Hard plate

Nylon Outer

Aramid/UHMWPE Backing layer

(SIDE PLATE)

after Bryn James, DSTL

# What did we need to achieve?

- Ceramic composite based on SiC
- Lower weight (lower areal density)
- Good Ballistic performance (threat?)
- Curved & Large Parts
- Low Cost Production
- Reduced Environmental Impact (low energy)
- Process can be scaled up
- UK manufacturing (materials from EU)



MADE IN THE UK

Not your usual university research project

*30mm, expensive, non-scalable, exotic raw materials, 3 years*

# Ballistic Testing

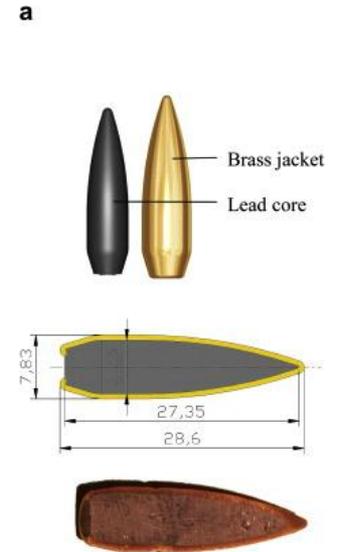


1901 - 7mm revolver, 3 steps, servant



1923 – soft lead bullet, subsonic velocity

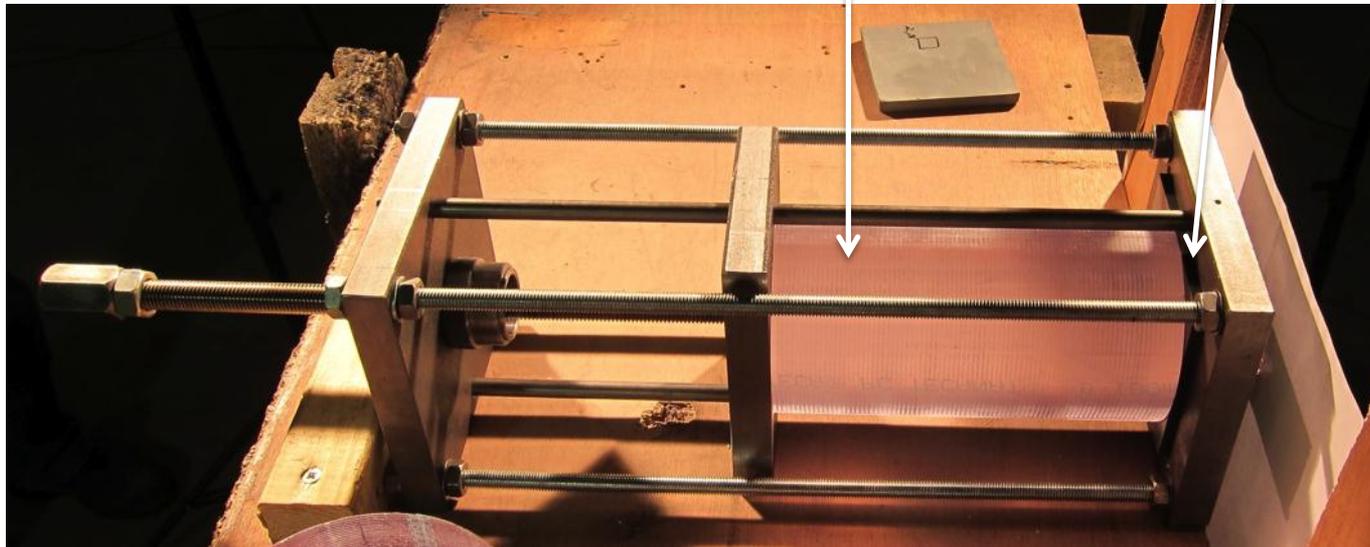
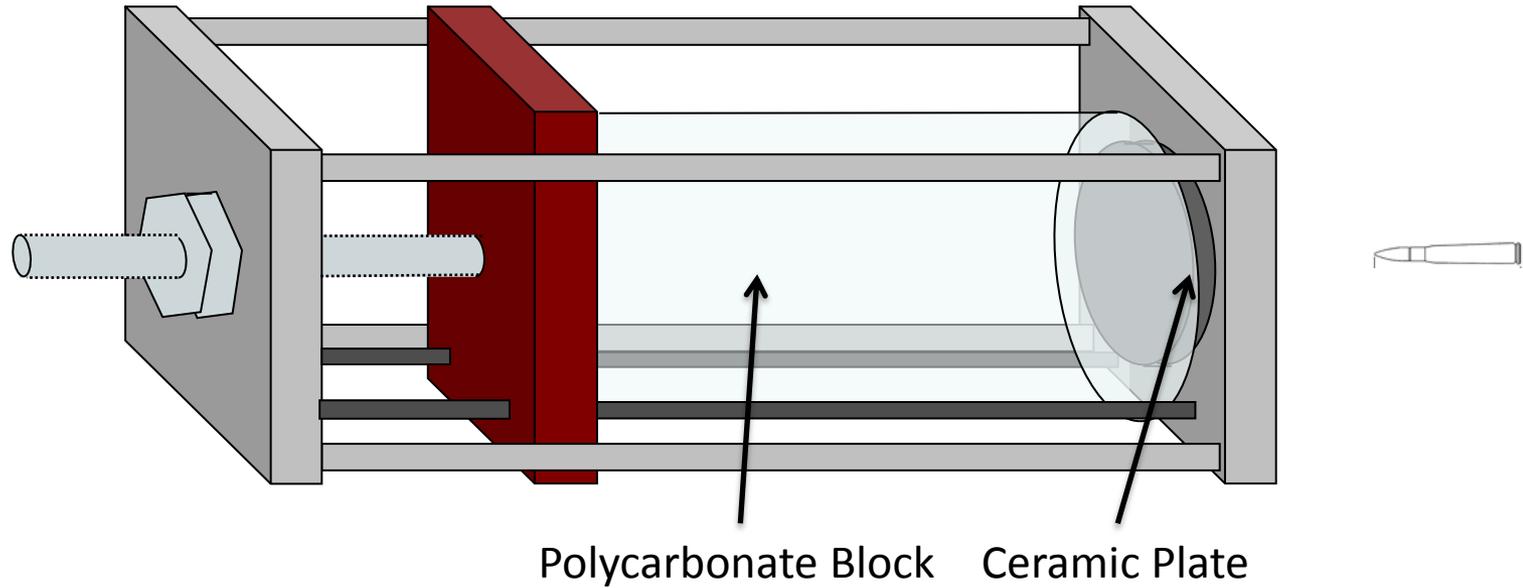
# Ballistic Testing - NIJ Level III – V50



7.52x51 NATO M80 Ball (9.6g)  
6mm + 10mm Dyneema  
V50 = 868ms<sup>-1</sup> (pass = 847ms<sup>-1</sup>)

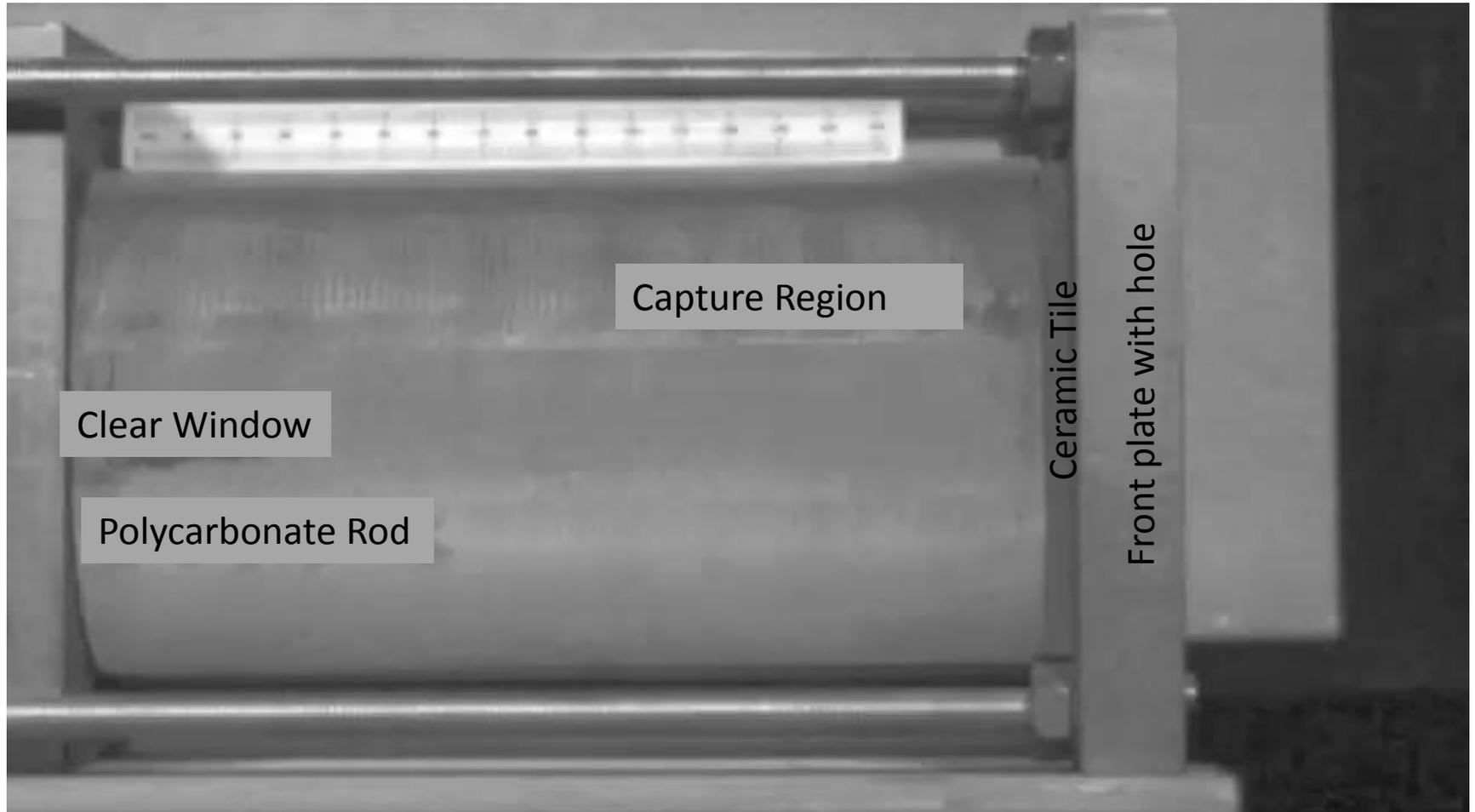


# Ballistic Testing - Depth of Penetration



Thanks to  
Gary Robinson

## Proving that it Works: The Power of a Demonstration



# People Places and Time Lines



**Dr Anthony Pick**, BSc, PhD, MRSC, CChem, MInst Ref Eng  
PhD Chemistry  
40 years industrial experience in ceramics manufacture  
Independent consultant - KeramTech  
XeraCarb Chief Technology Officer

# Time-line

2003-2007

ANP developing refractory SiC for kiln furniture

Tests as armour out of curiosity

Results interesting but not good enough

2007-2008

Tony & Hywel Meet. R2i

Develop refractory SiC composite using regional funds

2009-2010

**Early 09** CDE/RSC Speed Dating – Armourers & Brasiers Hall, London

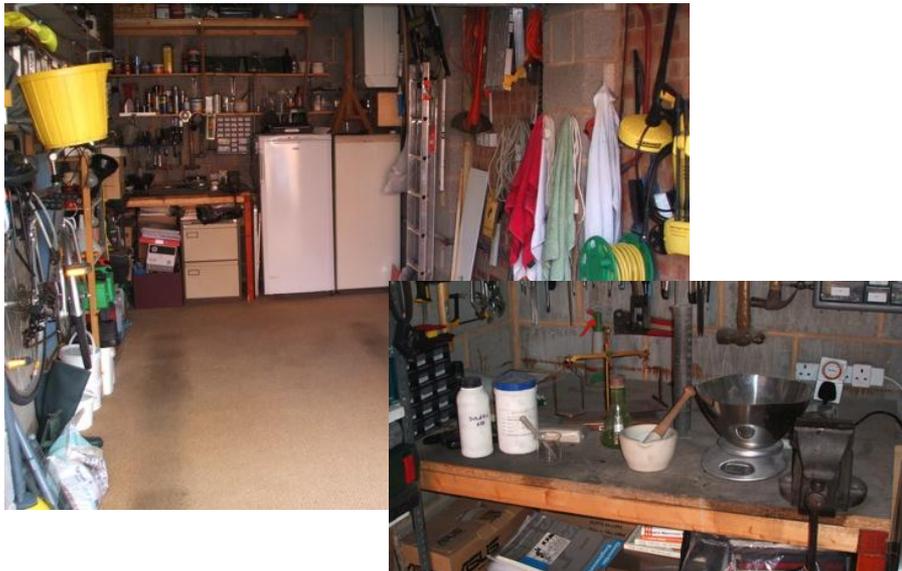
**June 09** - CDE Lightweight Protection Event, Harwell

**Oct 09** - CDE Contract Awarded - New lighter ceramic composite (3 months, £60k)

**Jan (Mar) 10** - Complete 1<sup>st</sup> CDE Contract

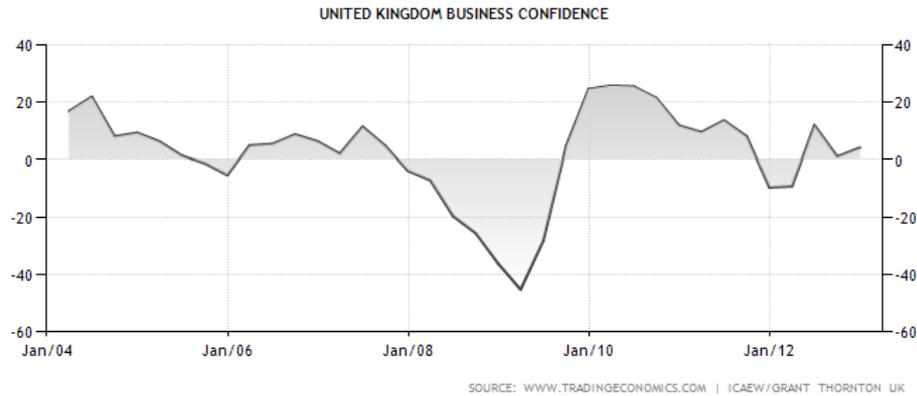
**May 10** - Invited to submit costed follow on work to DSTL

**July 10** – 2<sup>nd</sup> Contract Awarded – make real components! (£60k)



[dstl]

# Time-line



## 2010-211

Jan (Mar) 10 - Complete Contract

May 10 - Invited to submit costed follow on work

July 10 - Contract Awarded



Late 10 - contract amendments/variatio

Feb 11 Apply Armourers & Brasiers Venture Prize

May 11 A&B Venture Prize Won (£25k)

June 11 Meet Funding Providers

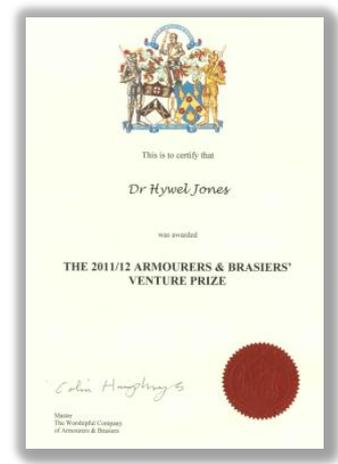
Enterprise Centre

Delays

Aug 11 Form company **XeraCarb Ltd**

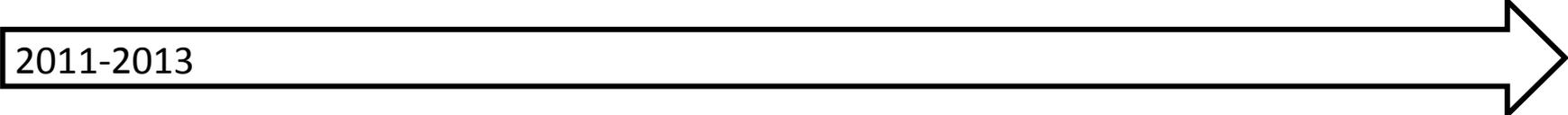
Dec 11 – 1<sup>st</sup> Round Investment, Finance Yorkshire (£75k)

Personal Warranty of work to date £££



# Time-line

2011-2013



**Jan 2012 – Execute Business Plan Mk 1 – feasibility, development and verification**

Ceramics manufacture & testing (incl. Ballistics)  
Recruitment of Executive Chair  
Identify Applications and Markets  
Build 2<sup>nd</sup> business plan (with new Chair)

IP Assigned to XeraCarb  
Incl. future developments

Longer than  
anticipated



**May 2012 Begin seek 2<sup>nd</sup> Round Funding**

Enterprise Centre

Enterprise Centre

**Sept 2012 - 2<sup>nd</sup> Round Funding Secured (£ 6 figures)**

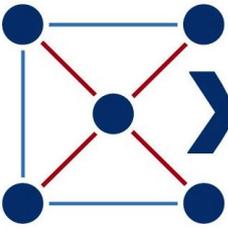
Personal Warranty of Science/Technology £££

Longer than  
anticipated



Seek Premises  
Specify, Source and Order Capital (Furnace)  
Recruit Plant Manager & Business Development Manager  
Seek Agents in Europe and Customers  
Ballistic Testing

Feb 2013 Set Up Manufacturing Unit



# XeraCarb

[www.xeracarb.com](http://www.xeracarb.com)

[info@xeracarb.com](mailto:info@xeracarb.com)

Money.....

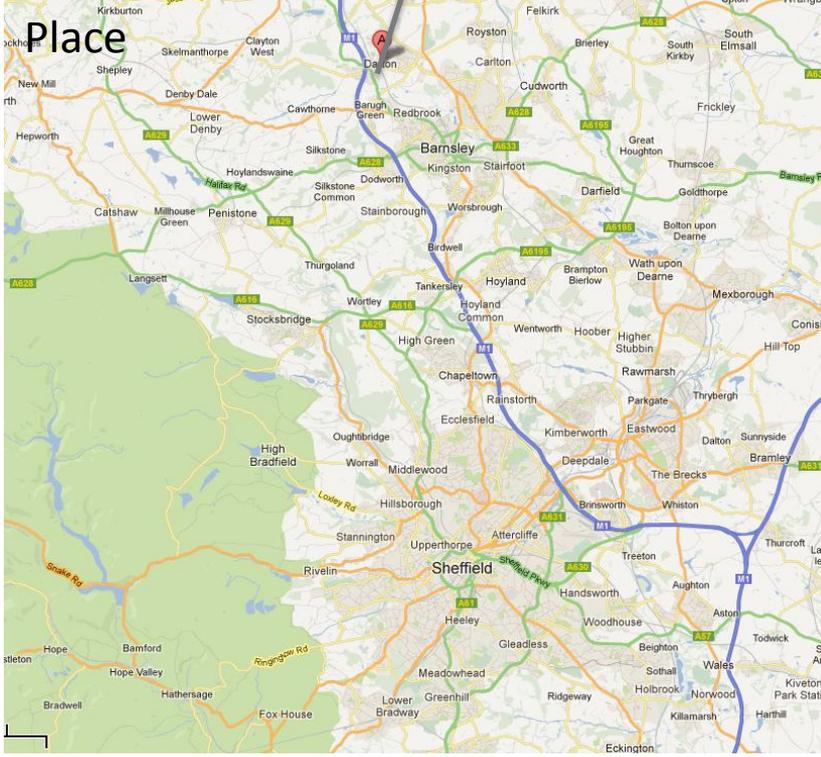
£100,000 initial investment (£25,000 “prize”)

£550,000 2<sup>nd</sup> round from 3 sources

£???????? 3<sup>rd</sup> round 3+ sources.



People





Local (Darton, 40mins)  
Accessible (M1 J37/38 10mins)  
Affordable  
Room to Expand

Services:  
Power Supply  
Nitrogen Supply  
Transport  
Landlord

Neighbours helpful!  
Good sandwich/cake shop!  
Its "real"!

# Get a Real and Virtual Presence

Welcome | XeraCarb

www.xeracarb.com

BBC NEWS | ... Front Page | Google Maps | Library Gate... University | SHU STAFF | NetStorage | Apple | Popular ▾ | My Itinerary Mobile | Post with Tweetie

Home | About Us | Our Materials | Applications | News & Events | Contact Us

## XeraCarb

### Our Materials

Our composite combines the best properties of a number of ceramic systems including silicon carbide, silicon nitride and alumina.

### XeraCarb Ltd

#### Technically Engineered Ceramics

XeraCarb Ltd. is an innovative UK company manufacturing high performance ceramics for kiln furniture and other demanding technical applications.

XeraCarb was founded in 2011 to exploit the potential of our proprietary ceramic composite material. This material, developed in conjunction with Sheffield Hallam University, is already being manufactured into industry leading products.

### About our material

- Lightweight Ceramic Composite
- Highly durable
- Excellent thermal stability
- Available in complex shapes and sizes
- Increases energy efficiency
- Innovative World leading technology
- Manufactured in the UK

Read more about our materials.

Download our Kiln Furniture Data Sheet.

### Latest News

#### XeraCarb Starts £175,000 TSB SMART Project

On April 1st 2013 XeraCarb began a £175,000 TSB Proof of Concept SMART project which will seek to explore new applications and markets for XeraCarb's ceramic composite technology.

Published on Apr 1<sup>st</sup> 2013

#### XeraCarb Secures Significant Investment (Sept 2012)

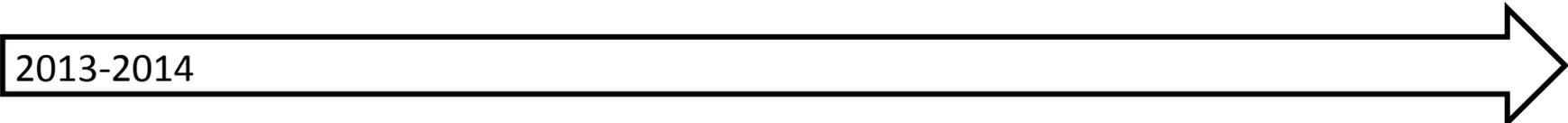
XeraCarb Ltd has been successful in securing a significant six figure investment to fund the setting up of a ceramic composite production facility in South Yorkshire.

Published on Sep 3<sup>rd</sup> 2012

Design It  
Keep it up to date  
Images!  
Datasheets  
Contact Points  
Stories

# Contribution to everyday running of XeraCarb

2013-2014

A large, black-outlined arrow pointing to the right, spanning most of the width of the slide. The text "2013-2014" is positioned inside the arrow's tail on the left side.

Recruit Plant Manager & Operative

Specify, Order and Install Large Kiln

Commission Kiln

Specify and Order Raw Materials

Start Sales Activity (free materials) 

Deal with Teething Problems

Apply for Grants 

Test Products 

Deliver & Manage Grant Funded Projects 

Board Meetings (monthly) 

Management Meetings (weekly) 

Company Visits and Events (2 per month) 

Contribute to and Manage IT/Web 

# Its About the Team

Many excellent ideas fail because they have the wrong team

Many not so good ideas succeed because the team is strong

Hermann Hauser, CBE, FRS, FREng FinstP Cphys

Founder of Acorn computers and ARM (Risk) processors



# Other Markets:

- Furnace Furniture
  - firing porcelain or super-alloys
- High temperature applications
  - Gas Burner nozzles
- Wear resistance – tiles, pipe liners



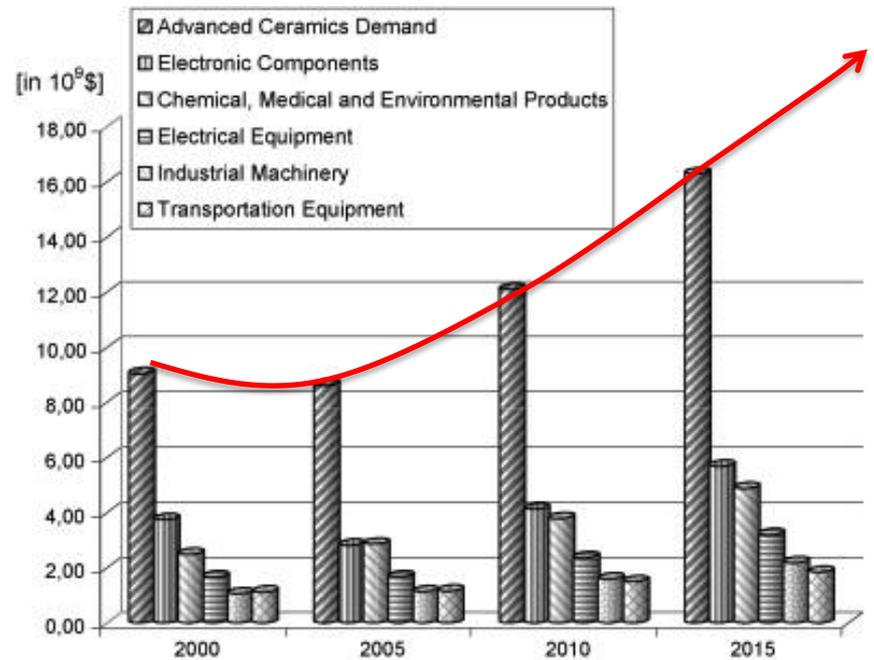
# Know the Market

Development of the US market for advanced ceramics from 2000 to 2015.

J Rodel, et al, Journal of the European Ceramic Society, Volume 29, Issue 9, June 2009, Pages 1549–1560

## Market Sizes

- Global Advanced Ceramics Demand
- EU Technical Ceramics
- EU Refractory Ceramics
- 2010 SiC market
- **Kiln Furniture**
- US **ceramic armour** market
- **SiC wear parts**
- Ceramic Matrix Composite market



\$10bn (\$17bn by 2020)

€2.5bn

€3bn

\$731m, >\$1bn by 2020

\$300m, EU ~\$100m

\$570m ( $B_4C$ ,  $Al_2O_3$ , SiC, metals)

\$80m, \$144m by 2020

\$330m (mostly SiC)

# Some Issues to Consider: Spin-Outs

- What is your stake in the company?
- What is your role in the company to be?
- How will the company pay for you?
- How will you make time for this?
- How will you be rewarded for this?
- What will you stop doing to make time?
- Is this activity valued and rewarded by SHU?
- Is this the direction you want?
- When will you stop? Exit Strategy

## Success to Date (spin out is only the beginning)

- MOD contract - incorporation of super-hard phases
  - £60,000 contract with SHU, IP exploited by XeraCarb
- TSB Proof of Concept SMART (Mar 2013)
  - £175,000 project/15 months, develop for wear & thermal applications
- Royal Society Industrial Fellowship - 2 years
- MOD Contract - pressure casting project
  - £284k + £100k, 2 years
- SALES?????????



Technology Strategy Board  
Driving Innovation



**THE ROYAL  
SOCIETY**



# Thank You



**Sheffield  
Hallam  
University**

Materials and  
Engineering  
Research Institute

[www.xeracarb.com](http://www.xeracarb.com)

@xeracarb

[h.jones@xeracarb.com](mailto:h.jones@xeracarb.com)

[a.h.jones@shu.ac.uk](mailto:a.h.jones@shu.ac.uk)

# **Technology Transfer:**

Commercialisation of  
Intellectual Property

# Supporting Commercialisation

## Technology Transfer and Commercial Contracts Team

### Robert Evans

Technology Transfer Manager  
[r.evans@shu.ac.uk](mailto:r.evans@shu.ac.uk) ☎ 4293

### Graham Hulse

Intellectual Property and  
Commercial Contracts Manager  
[g.hulse@shu.ac.uk](mailto:g.hulse@shu.ac.uk) ☎ 2993

### Georgia Hatzigiannidou

Technology Transfer Officer  
[g.hatzi@shu.ac.uk](mailto:g.hatzi@shu.ac.uk) ☎ 2013

### Susan Smith

Commercial Contracts Officer  
[s.k.smith@shu.ac.uk](mailto:s.k.smith@shu.ac.uk) ☎ 3616

### Laura Alger

Legal Assistant  
[l.alger@shu.ac.uk](mailto:l.alger@shu.ac.uk) ☎ 3809

# Our Approach

- Identify and protect ***commercially valuable*** IP
- Manage the University's IP portfolio
- Manage the IP exploitation process:
  - Partnerships, licensing, spin out company creation
  - Lead negotiations involving partners
- Work closely with research teams

# Intellectual Property

- **Patents:** *Inventions*
- **Registered Designs:** *Aesthetic non functional elements of design*
- **Unregistered Design Right:** *Functional aspects of design*
- **Copyright:** Artistic/literary works; software
- **Confidentiality & Trade Secrets:** Recipes; formulations; know-how; unpublished research results; source code
- **Trade Marks:** Project names; product names; business areas

# How IP is Exploited

- **Licensing:** Royalties, technical fees, consultancy income
- **Spin out company:** Shareholding: SHU; inventors; and investors; opportunities to apply for grants otherwise not available to SHU
- **Commercial Partnerships:** Leading to consultancy income, collaborative funding applications, licenses, joint ventures, student sponsorship and more

# SHU IP Policy

- Established in 2001
- Guidelines - RIO - Intranet
- Generous payments to Inventors
- Same terms for Staff and Students
- Treated as income from employment for tax purposes
- Linked to Commercialisation

# SHU IP Policy

FIGURE 1				
Band	Net Revenue	University *	Inventor (gross payments)+	Faculty/Research Institute*
1	£0 -£25,000	5%	70%	25%
2	£25,001 - £50,000	20%	55%	25%
3	£50,001 - £100,000	25%	45%	30%
4	> £100,000	34%	33%	33%

The following table gives examples of the payments which will be made on a threshold basis. That is; where Net Revenue is £50k, individuals will receive 70% of £25k (Band 1) plus 55% of £25k (Band 2).

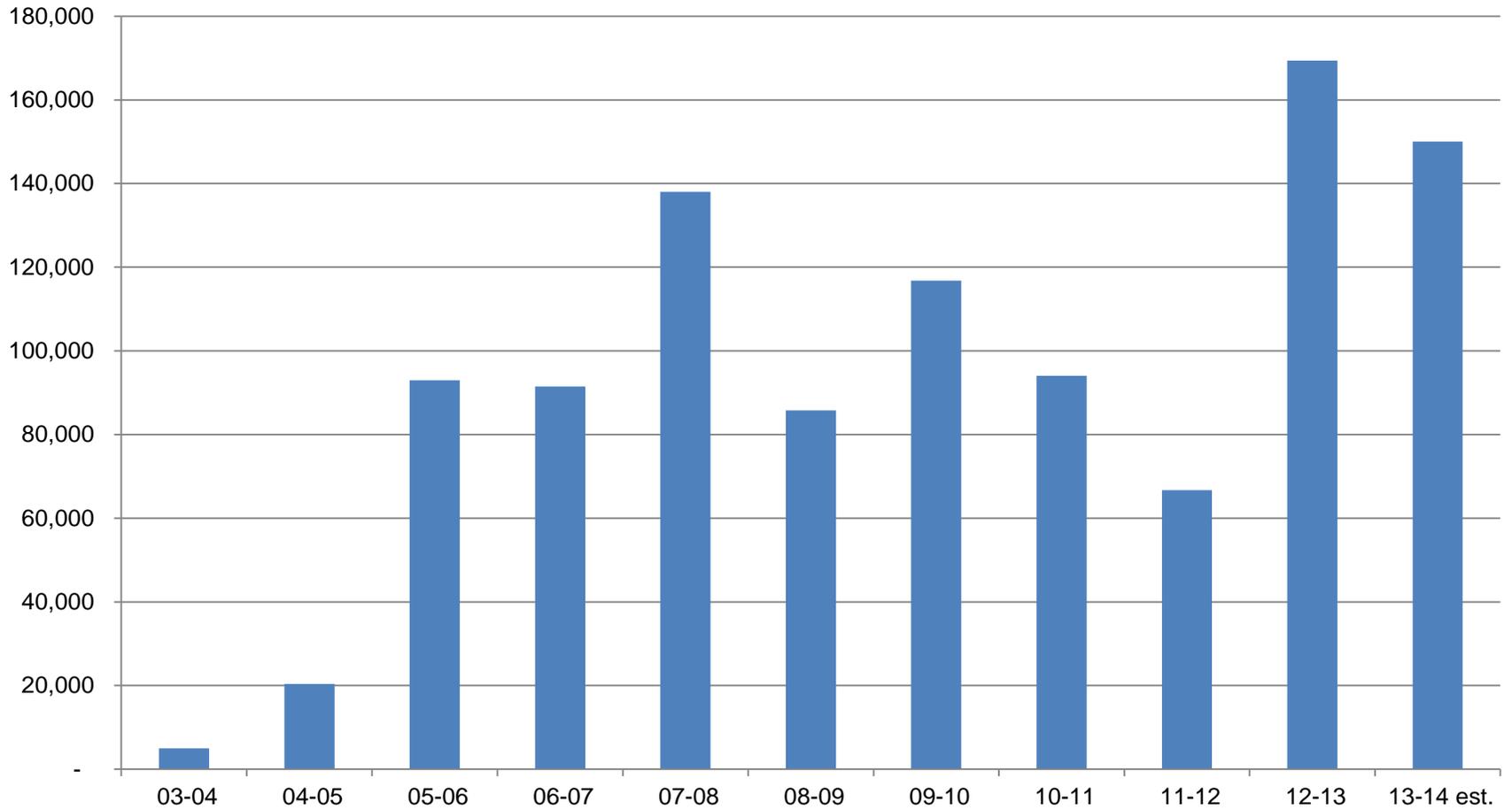
FIGURE 2			
Net Revenue	University*	Inventor (gross payments)+	Faculty/Research Institute*
£25,000	£1,250	£17,500	£6,250
£50,000	£6,250	£31,250	£12,500
£100,000	£18,750	£53,750	£27,500
£500,000	£154,750	£185,750	£159,500

+ These payments will attract Income Tax and other such liabilities. Under current HMRC and Treasury practices any such Tax and NI due will be deducted at source and Royalty Share will be paid via Payroll.

# Patent Portfolio

- Annual Budget of £80,000 (+reinvestment of RIO royalty share)
- Since July 2002
  - 186 applications filed including 72 UK
  - 79 granted (31 UK)
- Currently
  - 42 pending applications
  - 60 granted in force patents (UK +12 other countries)

# Royalty Income



# Spin Out Companies

**Sheaf Innovations Ltd**  
**Liquid Granite Limited**  
**XeraCarb Limited**  
**TacMap Limited**

# Commercial Contracts

- Compliance with University regulations and Faculty procedures
- Manage and mitigate corporate risks for SHU
- Review and draft contracts, variations, extensions and terminations
- Act as gatekeeper to authorised signatories
- Involvement in liaison or negotiation
- Advice on contractual disputes

# Commercial Contracts

- Confidential Disclosure Agreements (CDA/NDA)
- Invitations to Tender/PQQs
- Non-regulated funding agreements and terms
- Consultancy Agreements (IN/OUT)
- Collaboration/Consortium Agreements
- Sub-contracts
- IP Agreements (Licence/Option/Assignment)
- Material Transfer Agreements
- Terms & Conditions
- Memoranda of Understanding

# What do YOU need to do to initiate Commercial Projects

- Maximising Enterprising Potential
  - understand the commercialisation process
  - understand the outputs from your research
    - what will you create?
    - what value might it have to others?
    - who might benefit?
    - what more needs to be done?
    - is it really that different?
- People to talk to
  - Research Innovation Office
  - Faculty/Research Centre Business Development Managers
  - Line managers
- People not to talk to
  - Strangers
- Don't be shy - we are here to help

# Supporting Commercialisation

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## Design Futures can help to carry out....

Human centred design and user research

Early-stage idea generation

Product concept innovation

Design visualisation

Ergonomic design – cognitive and physical

Prototyping and testing

Product development

Design for production

Heath Reed, Principal Industrial Designer, Senior Design Researcher

[heath.reed@dfgroup.co.uk](mailto:heath.reed@dfgroup.co.uk) - Ext 6762

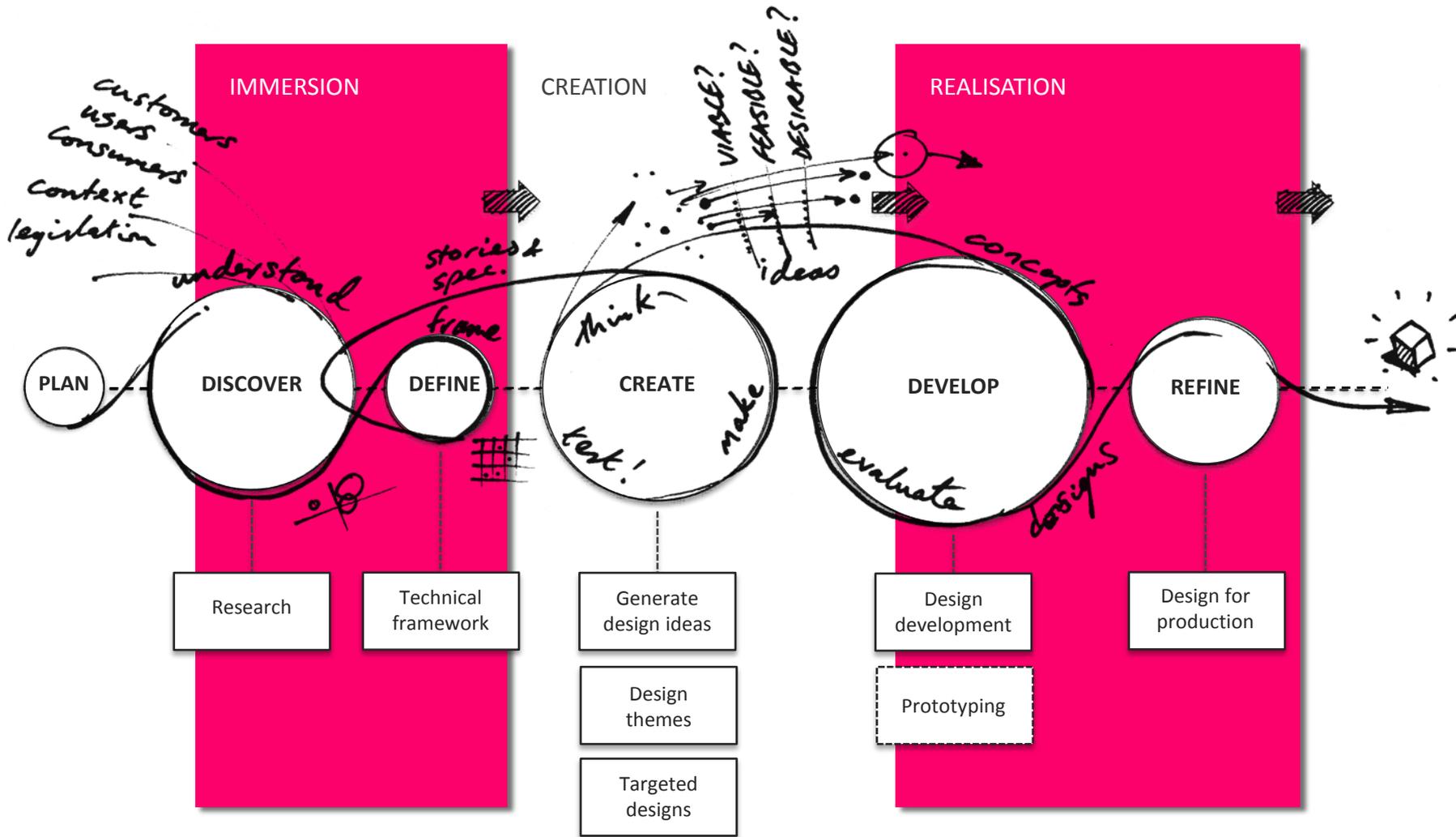
Design Futures can help to carry out....



Heath Reed, Principal Industrial Designer, Senior Design Researcher

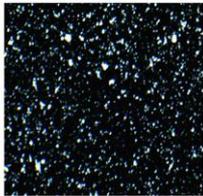
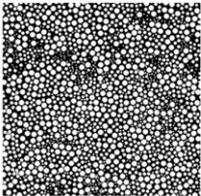
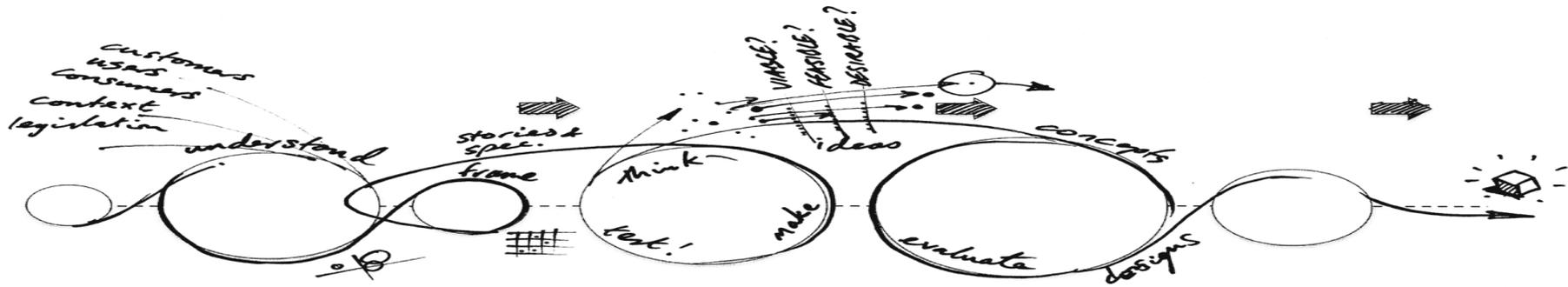
[heath.reed@dfgroup.co.uk](mailto:heath.reed@dfgroup.co.uk) - Ext 6762

**Sheffield  
Hallam  
University** | Design  
Futures



Heath Reed, Principal Industrial Designer, Senior Design Researcher

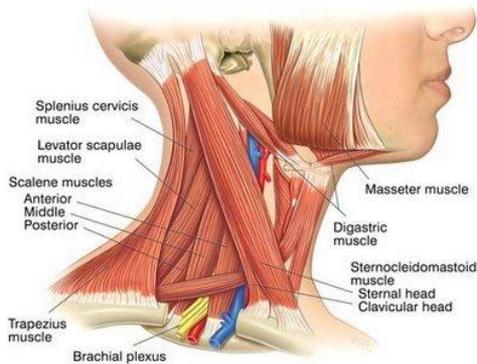
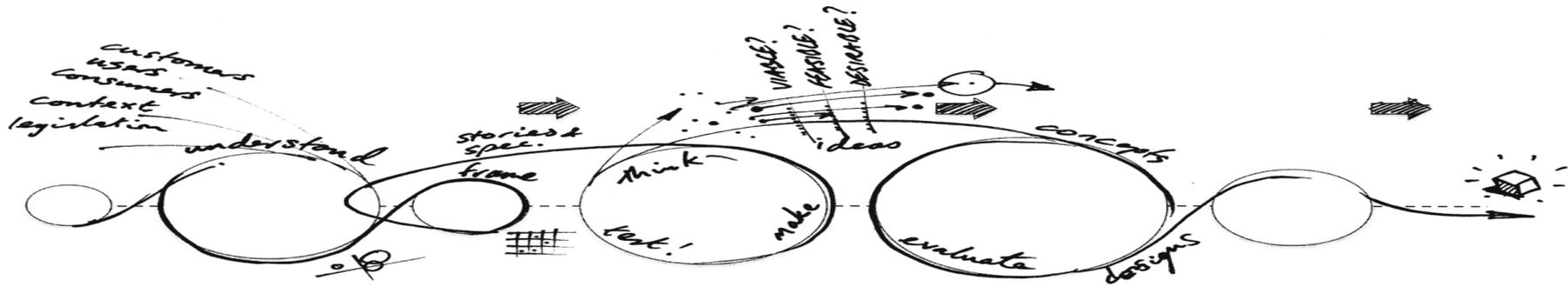
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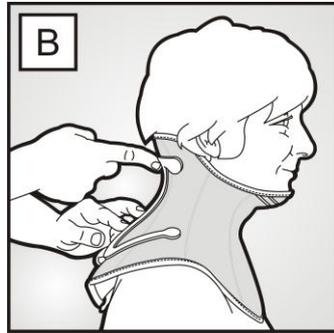
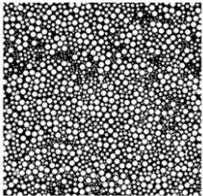
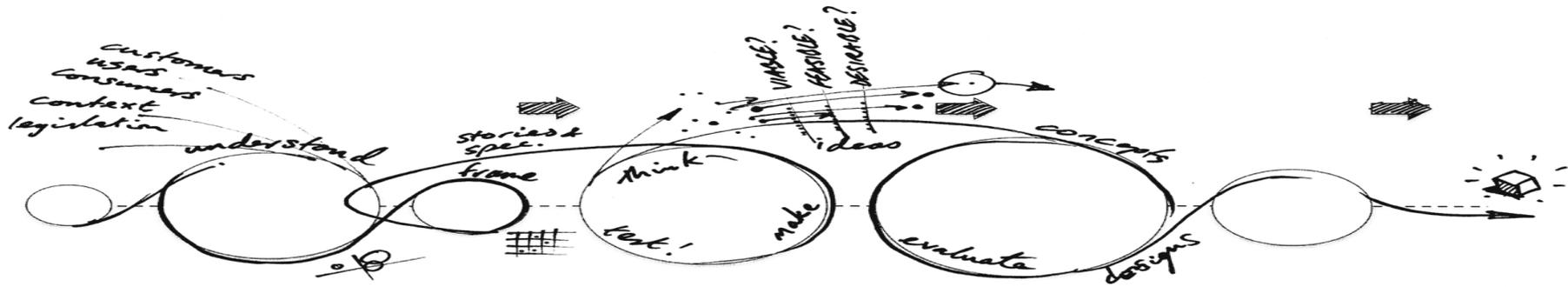
Engineering for Life 'Finger marks' matrix deposition gun concept

Heath Reed, Principal Industrial Designer, Senior Design Researcher

[heath.reed@dfgroup.co.uk](mailto:heath.reed@dfgroup.co.uk) - Ext 6762



Heath Reed, Principal Industrial Designer, Senior Design Researcher  
[heath.reed@dfgroup.co.uk](mailto:heath.reed@dfgroup.co.uk) - Ext 6762



Heath Reed, Principal Industrial Designer, Senior Design Researcher

[heath.reed@dfgroup.co.uk](mailto:heath.reed@dfgroup.co.uk) - Ext 6762

Discussing the matter with the biomechanics (analytical) team it was agreed that an algorithm may be able to be written to perform auto counts of the samples. This proved successful with data indicating particle count and particle distribution across the sample surface by looking at size and distance to nearest neighbour.

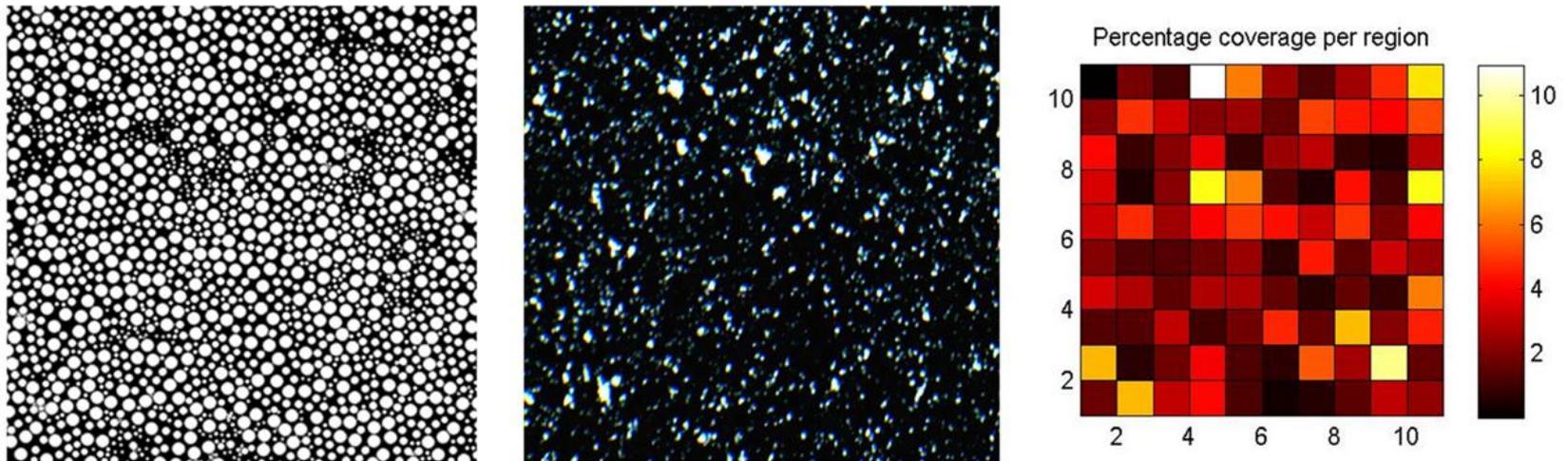


Figure 5 Original target distribution graphic representation (left), 5a Example (actual) 1mm square test sample optical image capture (mid) and 5b Test sample algorithmic analysis output (right)

In addition the distribution characteristics identified in the target illustration (from figure 2) were run through the system to give a target data set. Of note is the similarity of the hypothesised target distribution and the actual samples.