



Developing an online knowledge base of 3D metrology

www.3DIMPact-online.com

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3DIMPact

3D Imaging, Metrology & Photogrammetry
applied coordinate technologies





A development which will:

- **Create an online knowledge base of 3D metrology**
 - Focused on portable 3D metrology but embracing a wider 3D spectrum
- **Improve the engagement between industry and research**
 - Cooperative development between industry and UCL's 3DIMPact group and partners
- This is a major undertaking which can benefit the whole community
 - End users, students, systems suppliers, service companies, training providers, researchers
- When operational, the resource must generate revenue to be self-sustaining
 - Sponsorship by commercial companies is one possible way to achieve this

training



systems



service



user



University College (UCL) London has provided seed funding for a 12-month project to create a prototype website as a test tool for the knowledge base and industry contact point:

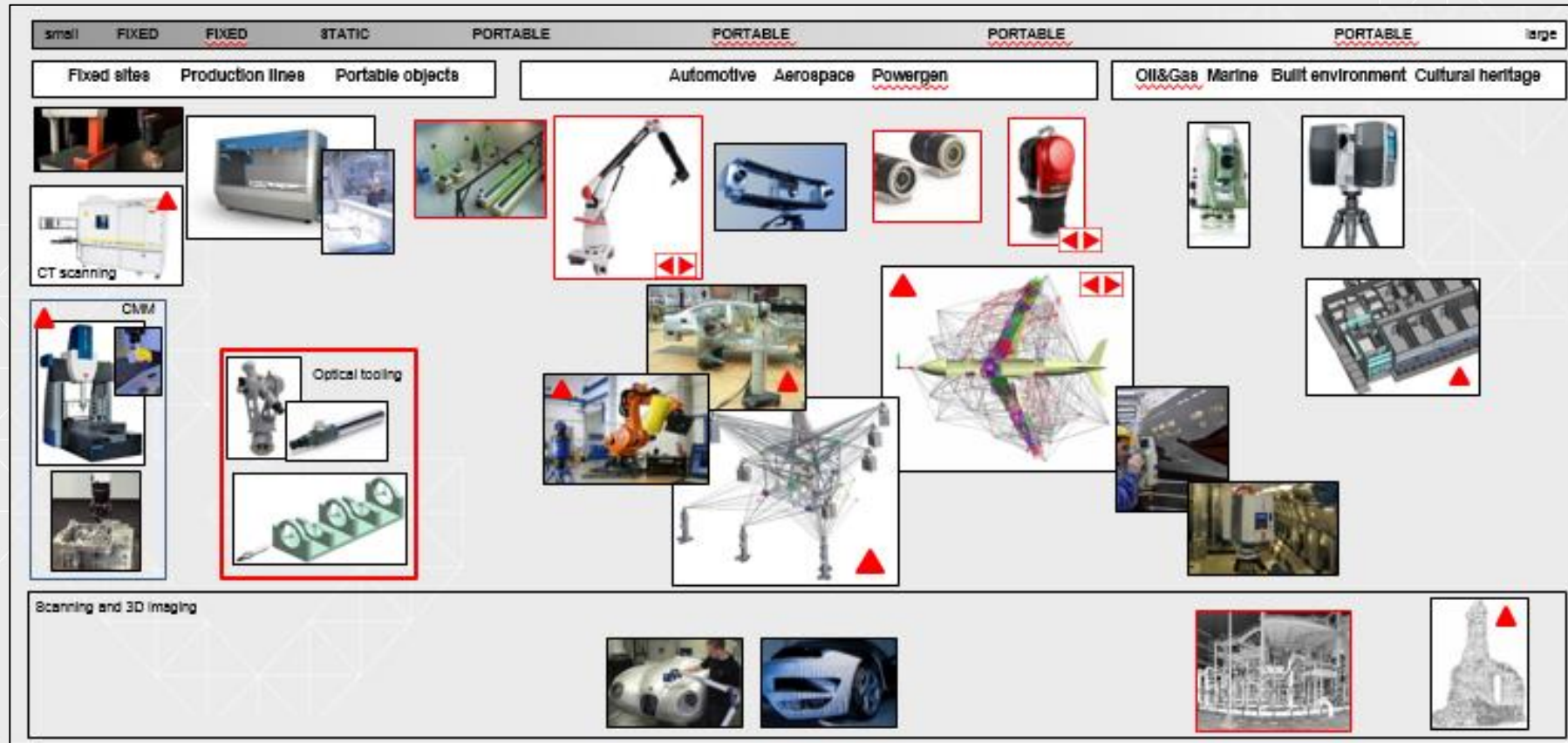
- Mid-March 2016 to mid-March 2017
- Delivered by the 3DIMPact group at UCL
- A non-commercial test phase: evaluate audience interest, refine website design and content
- Prototype test tool: www.3DIMPact-online.com

Outline of presentation



- The metrology community
- The project
- Prototype and operational model

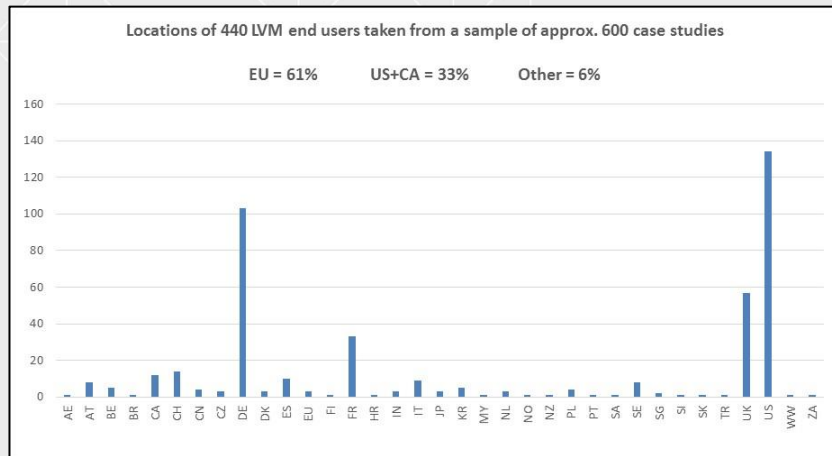
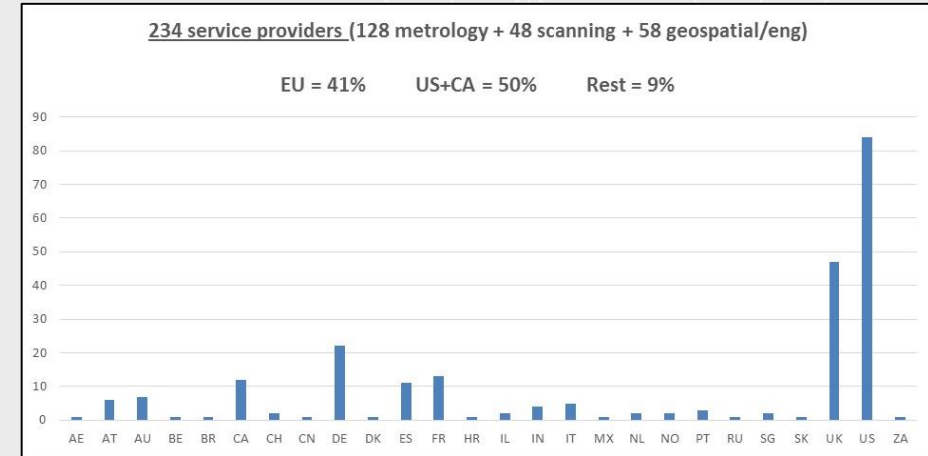
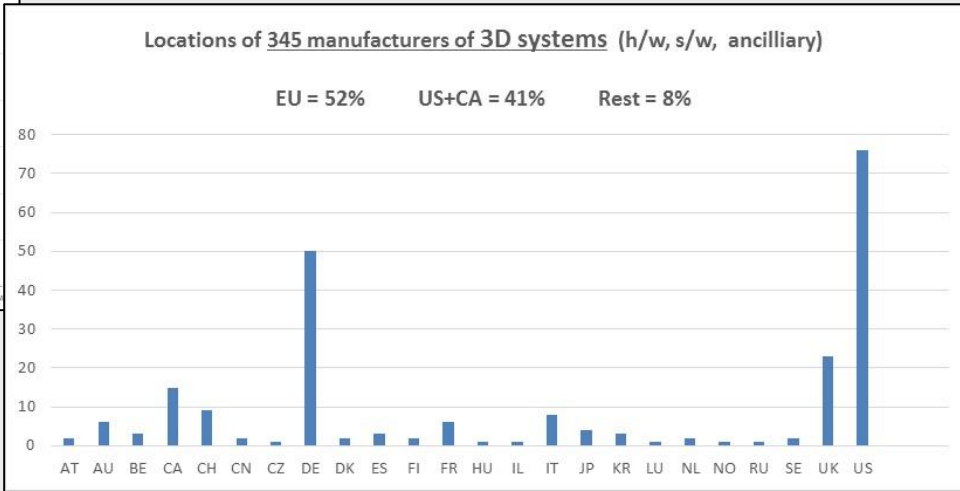
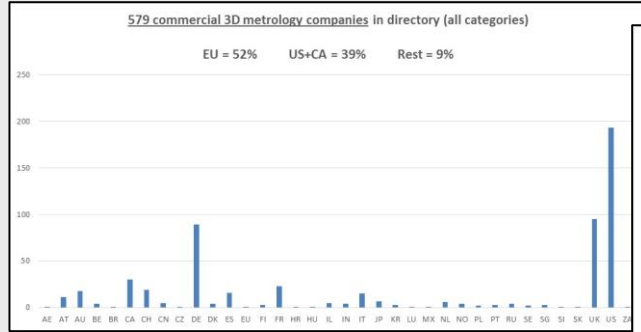
The metrology community



- Portable Coordinate Metrology is 30 – 40 years old but knowledge about it remains fragmented
 - We aim to create a central, accessible and comprehensive source of PCM knowledge and learning
 - To be supported by information on related technologies (CMMs, as-built recording, etc)

- The general audiences for the knowledge base, and their objectives, are:
 - **Technology users:** learn about 3D metrology via direct access to a coherent, structured body of knowledge
 - **Technology suppliers:** promote tools and services to a world-wide audience
 - **Technology educators:** offer training in various online and offline forms
 - **Technology researchers:** promote capabilities and engage with industry in further development
- The proposed online facility complements a wider scheme of knowledge transfer:
 - **Self-learning (3DIMPact-online):** library-style access to information; products and techniques via videos
 - **Guided training:** remote learning; video courses; classroom training; hands-on training
 - **Conferences:** networking; presentations of current practice and new ideas; hands-on new products
 - **Technology development (3DIMPact-online):** support for closer industry/research engagement

Commercial audience and potential sponsors of 3DIMPact-online.com (Sources: SK's directory and applications database)

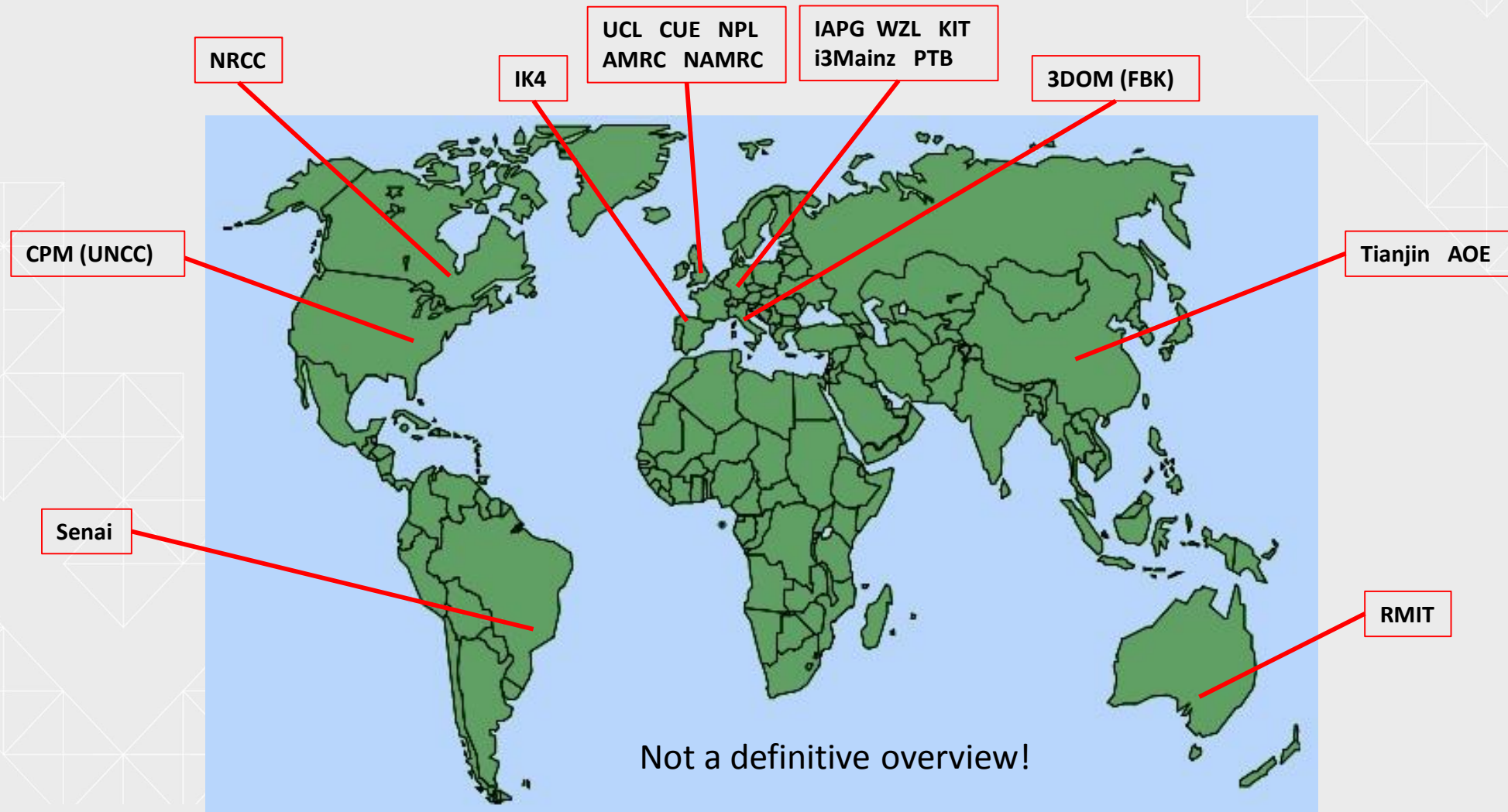


Approx. 600 companies, organizations and groups in the main directory of which:

- Approx. **350 metrology systems manufacturers** (Hexagon, FARO, etc)
- Approx. **230 service companies** (G2Metric, VMT, Survice Metrology, etc)

Approx. **440 end user companies** in the applications database but more are known

The 3D metrology research network



The project



- One of the UK's largest universities
- A global presence and strong brand
- Regularly in world-wide top 10



- Publisher of geospatial magazines
- Geospatial and PCM closely linked
- Now adding metrology products to:



QS World University Rankings 2016-2017: Top 10

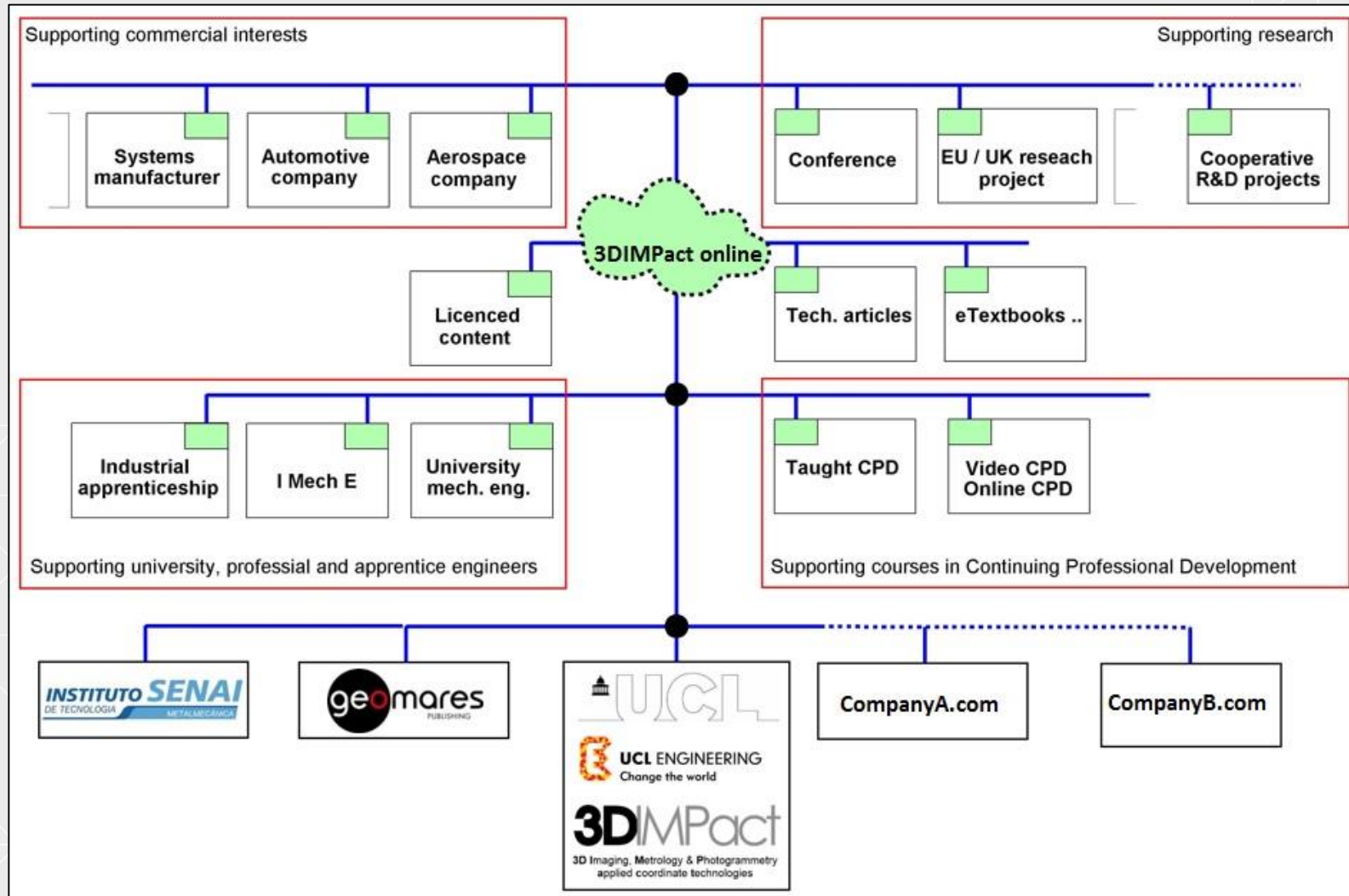
2016	2015	Institution	Country
1	1	Massachusetts Institute of Technology (MIT)	United States
2	3=	Stanford University	United States
3	2	Harvard University	United States
4	3=	University of Cambridge	United Kingdom
5	5	California Institute of Technology (Caltech)	United States
6	6	University of Oxford	United Kingdom
7	7	UCL (University College London)	United Kingdom
8	9	ETH Zurich – Swiss Federal Institute of Technology	Switzerland
9	8	Imperial College London	United Kingdom
10	10	University of Chicago	United States

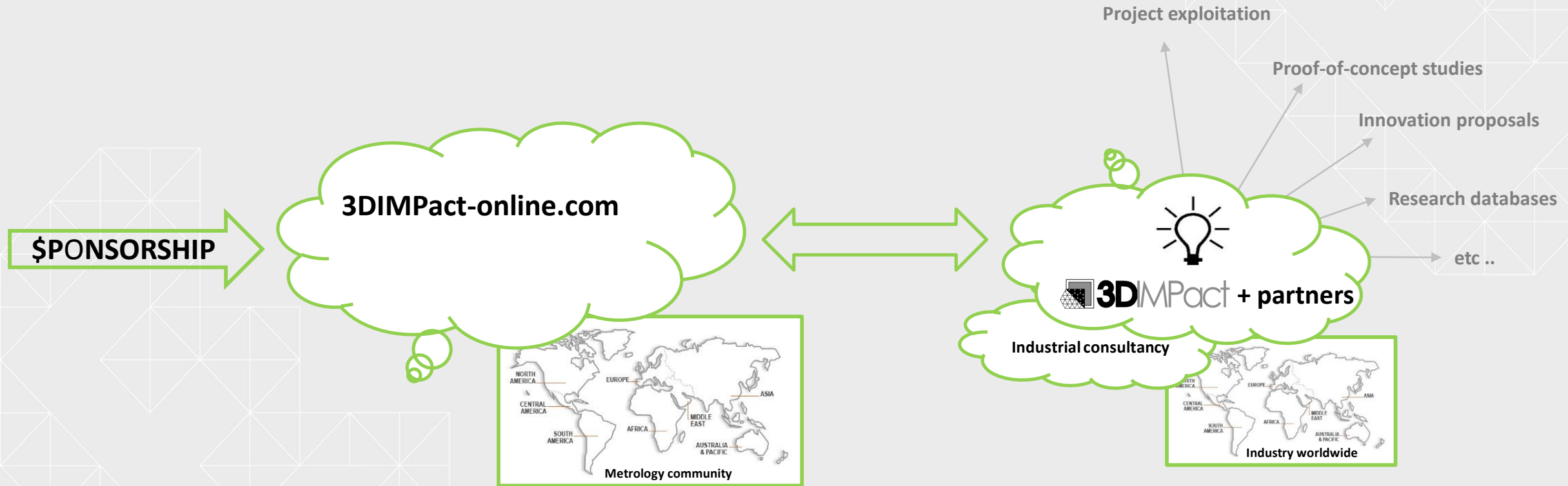
- Research group at UCL
- Lead by Stuart Robson
 - Professor of photogrammetry and laser scanning
- Major source of R&D in 3D metrology
- Partner in large research projects
 - Light-Controlled Factory, ..
- Good industrial contacts
 - Airbus, NASA ..



- New Brazilian institute
- Supported by Brazilian industry
- Building up metrology expertise
- Example project: shipbuilding

3DIMPact online in a wider context





Prototype and operational model

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CEGE - 3DIMPact

If the parts don't fit ...
... the product won't work

... the plane won't fly ...
... the car won't go ...
... and the mower won't mow!

The 3D shape and size of all the parts must be right!

UCL ENGINEERING
CEGE - 3DIMPact

3D measurement map

UCL ENGINEERING
CEGE - 3DIMPact

Applications of laser trackers / 2

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3DIMPact online – a developing resource

HOME SHOWCASE ACADEMY LAB

Explore 3D metrology and PCM - portable coordinate measurement

Why PCM?

Explore the 3D measurement map

About the project

SHOWCASE

ACADEMY

LAB

PARTNERS

ASSOCIATES & SUPPORTERS

UCL ENGINEERING
CEGE - 3DIMPact

Academy

HOME SHOWCASE ACADEMY LAB

Applications database
700 entries, 1000+ on file

Problems >> Solutions
Suggested solutions for specific tasks

Metrology in Focus
3D metrology for selected groups

Tutorials, seminars and illustrated text for self-learning

- 3D overview: portable - static - fixed
- 3-axis CMMs
- CMM arms
- Photogrammetric methods
- Laser trackers - total stations
- 3D imaging
- Projection technology
- Optical tooling and alignment
- CT - Computed Tomography
- How it works: laser trackers - 3D scanners - vision metrology - CT - iGPS ..
- Instrument modelling and calibration: camera - tracker ..
- Environmental issues
- Measurement uncertainty - standards - performance measurement
- Metrology for mass production - Gauge R&R - MSA - SPC
- GD&T – Geometric Dimensioning and Tolerancing
- Basic optics
- Essential maths: vectors - matrices - least squares - rotations - coordinates

LIBRARY
A listing of textbooks, guidelines, etc

A - Z
1000 terms in portable 3D metrology

UCL ENGINEERING
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Showcase

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Service providers
Classified by country
150 service providers

Research sources

Industry support

Metrology travel guides
The state of 3D measurement and metrology around the world

Who's who?
Individual experts contributing to the website

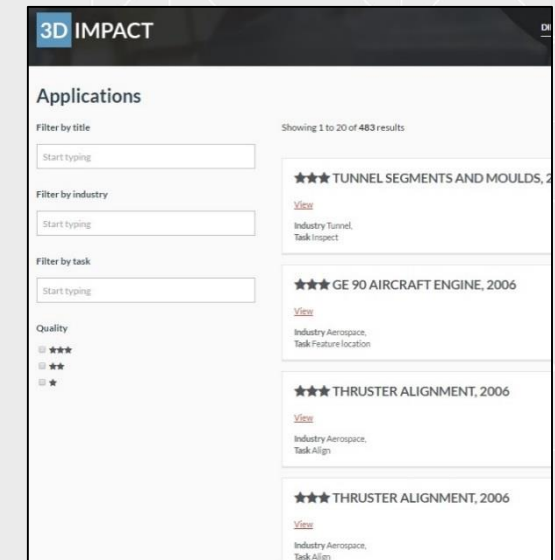
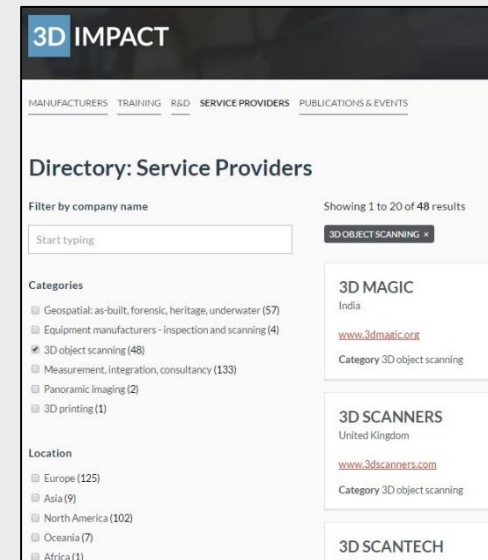
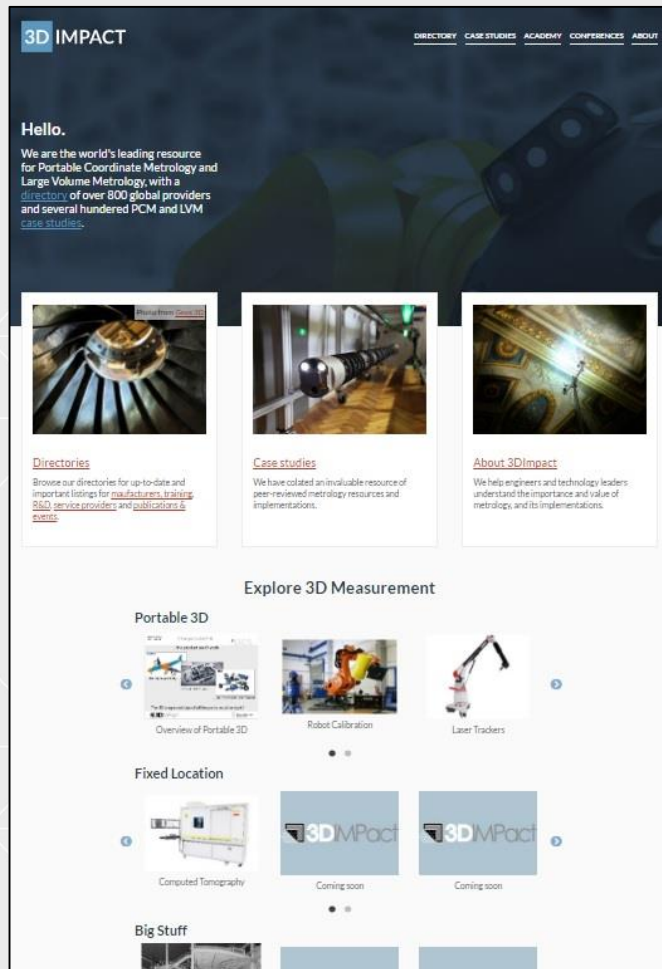
Conferences

CLICK! Intro

CLICK! Overview

CLICK! more ..

CLICK! Laser Tracker intro



Trial elements currently in place:

- Directories of systems, services, research (600+ entries)
- Applications database (~ 500 files from source of 1000+)
- Introductory slideshows

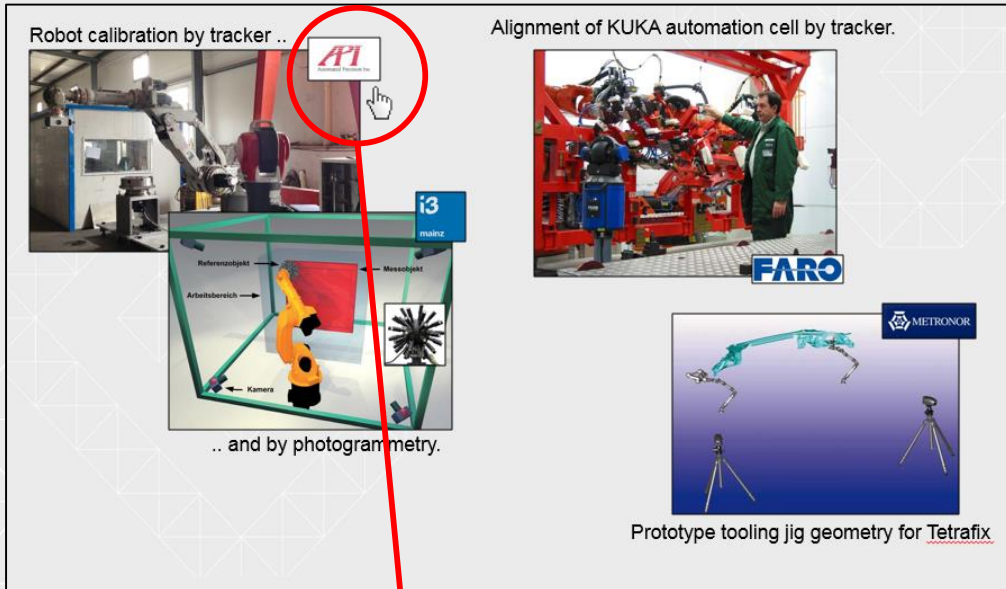
More to come:

- Dictionary of portable 3D metrology (1000+ terms)
- Extensive library (How-it-works, best practice, etc)

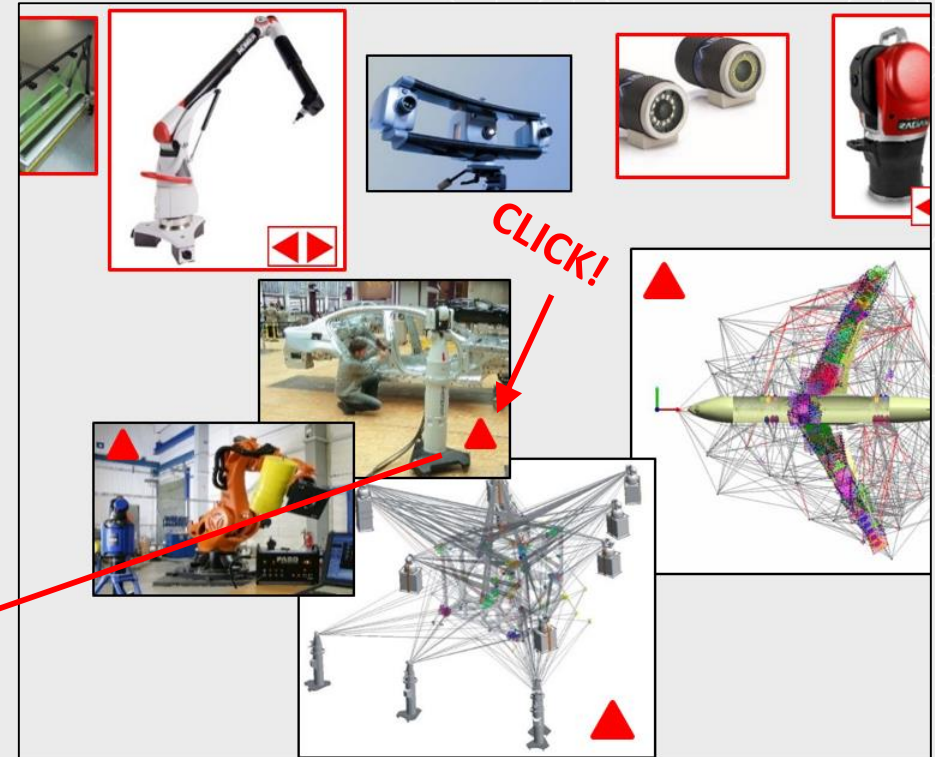
Note that access is not currently public but restricted to a selected group of trial users and supporters.

- Many options possible such as corporate/individual membership but as a first option:
 - Free access funded by commercial sponsorship
 - (similar to a common model of free access + advertising)
- Commercial companies have a number of routes to promote products, skills and capabilities, e.g.:
 - Trade shows
 - Conference exhibitions
 - Trade and technical magazines
- Metrology website offers an alternative route:
 - Promotion via knowledge transfer
- Existing promotional budgets are large
 - Challenge: the website must attract a significant audience
 - Reward: become self-sustaining by capturing only a small fraction of this investment

Extract from sample presentation:



Extract from sample presentation:



Popup case study



Acknowledgements in images,
diagrams, texts, etc

Scope for popup directory
entries, etc

Seeking further support to continue this development

Contact: s.kyle@UCL.ac.uk

Acknowledgements

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