

Update Report 2

What Did The Initial Evidence Reveal?

This document is one of a series of brief updates on the development of a UK National Strategy for Additive Manufacturing / 3D printing (AM-3DP). Information on the background to the development of the strategy is provided at www.amnationalstrategy.uk.

This report summarises the initial analysis of evidence collected on barriers and opportunities for the adoption of AM-3DP in the UK as perceived during the Spring-Summer 2015 by a broad range of UK stakeholders.

Evidence Collection Process

The process of evidence collection combined stakeholder workshops with an on-line submission of evidence. Three workshops were held in the period March-June 2015 and the on-line submission of evidence ran from April-June 2015. Representatives of 143 organisations provided input via these two channels. The breakdown of the organisations' sectors is given in **Figure 1**. Details of the process used for the evidence collection are given in Update Report 1, available from the UK National Strategy for AM-3DP website.

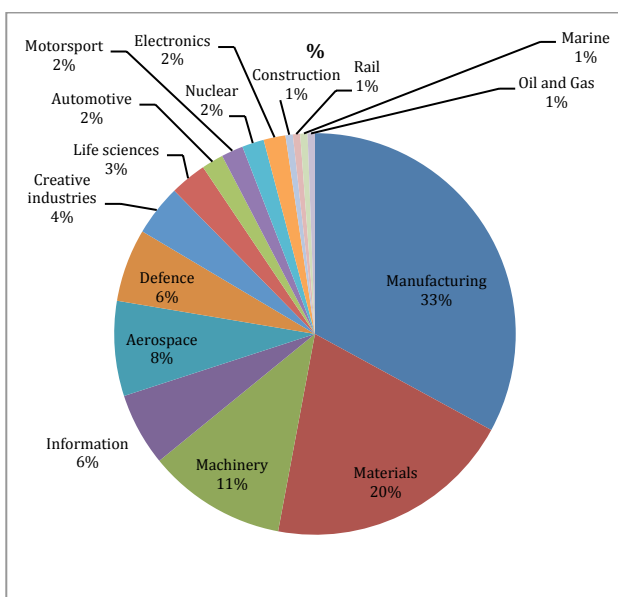


Figure 1: Organisations by sector

Analysis – Perceived Barriers

The views captured from the workshops and on-line submissions were analysed to identify commonly perceived barriers to the adoption of AM-3DP, as well as areas of opportunity for the UK.

Table 1 shows the rank order of the most frequently noted 'Top Issues' chosen by members of each of the 13 workshop groups at the three workshops.

Table 1

Ranking of top issues	Comments
1. Materials	Materials availability / protection, consistency, standardisation / certification, characterisation.
2. Standards	Mainly for materials, but also more generally (e.g. products made using AM-3DP processes).
3. Cost	Realistic estimate of costs compared to scale of opportunity to allow for viable business case, cost of testing / development.
4. Education / Skills	A broad range of issues including general level of awareness of AM-3DP, what skills will be required / availability of skilled people.
5. Design / Software	Issues of design and software were bundled together by groups – design guidelines, modelling, design opportunities.
6. IP	Balancing need to collaborate with IP concerns, IP and material availability.
7. Measurement	Particularly technology for in-process inspection.
8. Scale-up	Not clear whether this relates to increase in physical volume and/or numbers produced.

These results were used to structure the analysis of the contributions captured from the 848 individual inputs to the workshops and 56 detailed on-line submissions.

Work is currently underway to drill down into the data from the more detailed submissions and workshops to explore sector specific concerns, and to understand better the nuances of some of the issues raised. Interim results of the in-depth analysis are shown in Table 2, revealing the different rank ordering of perceived barriers (though perceived barriers relating to materials still appear as the top concern) and more details on the issues of concern.

Table 2

Issue	Summary of common perceived barriers
Materials	Understanding properties in different processes / machines / applications, QA, costs, availability (IP constraints, independent suppliers), use of mixed materials, recyclability, biocompatibility.
Design	Need for guides and education programmes on design for AM – better understanding of design for AM constraints, availability of AM-skilled designers, security of design data.
Skills / Education	Lack of appropriate skills (design, production, materials, testing) preventing adoption, up-skilling current workforce vs. training of next generation, education of consumers, awareness in schools.
Cost / Investment / Financing	Funding to increase awareness and reduce risk of adoption (testing, scale-up, machine purchase) – especially for SMEs, understanding of full costs (including post-processing, testing), cost of materials.
Standards / Regulation	Perceived or actual lack of standards – all sectors / sector specific (especially aero / health / motorsport), for processes / materials / software / products / applications.
Measurement / Inspection / Testing	Need data libraries, standards for tests (general and sector specific), materials/ in-process / final part, tests for higher volumes, non-destructive testing, QA through lock-in <i>c.f.</i> open access to data.
IP / Protection / Secrecy	Balancing need for openness to share knowledge with need for commercial protection to capture value from investments, enforcement of IP rights.

Analysis – Perceived Opportunities

Contributors to the workshops and on-line call were also asked to consider the main opportunities for AM-3DP in the UK. A very wide range of opportunities was noted with much less commonality than for the barriers. The opportunities highlighted were either very generic (e.g. ‘customisation potential’, ‘design freedom’) or very sector or company specific (e.g. ‘obsolescence management for custom car spares’, ‘custom sportswear’). However, there were some broad opportunity areas noted several times in various guises. These included: (1) the potential for the UK to set standards in a number of AM-3DP-related areas; (2) the role that AM-3DP adoption could play in changing perceptions of STEM careers and up-skilling of the workforce; (3) the opportunities that could be realised as a result of the way in which AM-3DP builds on existing UK strengths in materials research, design and related technologies (e.g. lasers and inkjet); and (4) the fact the UK already has many of the individual elements that could be connected to form a strong platform for value capture from AM-3DP adoption. These issues will be explored in more depth by sector groups.

Conclusion

The initial analysis of the results of the evidence gathering process reveals strong commonality of concerns around perceived barriers to the adoption of AM-3DP in the UK. Top among these are issues relating to materials, design, skills and education, costs and investment, standards and regulations, measurement and testing, and IP and protection. The perceived opportunities for the UK cover a very wide range, but stakeholders believe that the UK has the potential to build on strong existing capabilities, and that there is an urgent need to ensure that such opportunities are not missed.

This analysis is helping to define the activities of the next stage of the strategy development process, which will be described in Update Report 3.

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