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## **AM-motion**

A STRATEGIC APPROACH TO INCREASING EUROPE'S  
VALUE PROPOSITION FOR ADDITIVE MANUFACTURING  
TECHNOLOGIES AND CAPABILITIES

Grant Agreement N° 723560

# **SPEAKERS AND** **PRESENTATIONS INFO**

## **SECTION 1: An innovative industrial and social renaissance for Europe**

- **Jan Ramboer, *European Commission***

### **“Horizon Europe: the next research and innovation framework programme”**

- **Bernhard Langefeld, *Roland Berger***

### **“Additive Manufacturing - Technology overview and impact assessment”**

#### Abstract:

New Additive Manufacturing (AM) technologies are evolving in addition to the established processes of Powder Bed Fusion (PBF) and Direct Energy Deposition (DED). The new technologies are addressing other material properties, production volumes and cost levels and will therefore focus on other application areas than aerospace, medtech and turbines. The availability of these technologies will further boost the customization of products, require new software and manufacturing process solutions and allow new business models. In the presentation we will highlight the evolution of the AM technology, market development and key technological trends along the value creation system for 3D-printed products.

#### Biography:



Bernhard is a partner at Roland Berger in the Competence Center "Industrial Products and Services" with a strong background in manufacturing technologies and operations. Together with his team he continuously reviews the status and growth potential of Additive Manufacturing (AM) for metal structures and summarized the results in several studies, e.g. "Additive Manufacturing – next generation". From a consulting perspective Roland Berger supports clients in developing their AM Strategy on corporate level (Corporate AM Strategy), on component level (AM Industrialization Strategy) and in analyzing and understanding market entry opportunities.

Bernhard graduated at the RWTH Aachen in production technology and prepared his Dr.-Ing. thesis in the field of metal forming.

- **Dr. Alireza Parandian, *Head of Global Business Strategy, Materialise***

### **“Enabling mass customization with digital technologies – Managing innovations with a transformative potential”**

#### Abstract:

To understand how to scale mass customization projects with transformative potential, decision makers must understand the impact of digital technologies, including 3D Printing, on customer experience, product differentiation, operations and business model. This presentation reflects on a blue print for the

development of digital supply chains of personalized products. The presentation will reflect on different cases to highlight specific dynamics in the emergence and scaling up phases of these innovations. Key lessons on managing such Co-Creation processes will be provided.

Biography:



Dr. Alireza Parandian leads the global business strategy for additive manufactured wearables at Materialise. With a multidisciplinary background, he has helped to advance Materialise's strong innovation and co-creation culture, resulting in long-standing collaborations. Alongside a multidisciplinary team of experts, Alireza focusses on the mission to enable mass customization and personalization possibilities through digital tools and business strategies. Fastest patterns are emerging now in vision care and footwear sector which are being exploited in these vertical markets together with strategic partners active in each domain

**SECTION 2: Additive Manufacturing industrial challenges**

- **Virgilio Garcia, Global R&D Program Leader -area of Additive Manufacturing , ArcelorMittal**

**“AM industrial strategy in the steel sector”**

Abstract:

Nowadays the industry is focus in identify new prototype applications for additive manufacturing, this technology has been seen as a technique only for prototypes. In our point of view the technology can be used for heavy industry applications, always lead by a continuous analysis of the technologies available. Learning how to master the technologies to develop proper applications that can be used in the way to improve specific parts of our processes

Biography:



Electronic Engineer by University of Oviedo focused experience in Healthcare Electronics and Instrumentation. Msc in Mechatronics and Machine Construction in Karlsruhe (Germany).

Starting in R&D in the area of electronics for Gas Analysers in Siemens AG (Karlsruhe) more focused in the developing of new optic sensors for fine detection of Gases. Coming back to Spain into a company in the area of Powder Metallurgy PMG Asturias belonging from Plansee Group at that time. And focus on the development of new processes for new products and creating new lines of production for powder metallurgical auto parts. Later he has joined in the ArcelorMittal Group, as research engineer involve in several research projects based on Sintering area and since 2 years almost became the Global R&D Program Leader for ArcelorMittal in the area of Additive Manufacturing.

- **Vukile Dumani, Oerlikon AM GmbH**

### **“Additive Manufacturing: Qualification of a Special (*not-so-special*) Process”**

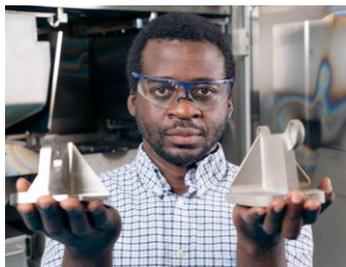
#### **Abstract:**

The qualification approach for aerospace manufacturing processes (Forging, Casting, Milling, etc.) is well known and documented. Guidance and methodologies are well documented in CS25 (EASA Certification Specification), MMPDS, ESDU, etc. The methodologies for generating material allowables, as prescribed by MMPDS §9, are manufacturing process-independent, meaning that Additive Manufacturing materials data Qualification is not regarded as *special* and is just another tool in the box for materials experts and designers to choose from. On the one hand, this is good news for AM as this negates the need for new statistical methods, but on the other hand, this approach highlights the complexity in qualifying AM parts and/or processes. This is brought about by the high level of variables that AM presents; far greater in magnitude than traditional manufacturing processes.

A prerequisite for any process qualification approach is standardisation. This entails mapping all the variables and delineating those that key from those that are not, monitoring those that are continuous and recording those that are discrete, understanding the influence of those that are deemed key, recognising the effect of those are out of bounds/tending towards limits/cyclic/etc., whilst at the same time standardising all key variables in material specifications. All this has to be done using approaches that make sense from a technical as well as commercial perspective. A backdoor approach around this has been to perform individual part qualifications and in a limited case part-families. However, this is expensive and not long-term viable in enabling AM to be fully competitive with traditional aerospace manufacturing processes.

In 2016, Nadcap assigned AM as a ‘special process’ and is now part of the Welding Task Group. Recently an audit checklist and associated handbook were published, meaning that organisations can apply for Nadcap accreditation for AM. Yet, as described above, the approach to qualifying AM is not special, thus the juxtaposition of qualifying a Special (*not-so-special*) Process.

#### **Biography:**



Vukile Dumani is a Principal Qualification and Test Engineer at Oerlikon AM GmbH, who has worked in Additive Manufacturing for 6 years and in Aerospace for 12, holding various positions within this industry. He has a rich and diverse background in defining Qualification, Standardization and Industrialization requirements for Materials, Processes and Methods for aerospace, defense, power generation and space sectors. As part of the Nadcap subcommittee for Additive Manufacturing he was instrumental in

developing and executing practical training to Nadcap auditors, as well as the development of Nadcap’s Additive Manufacturing checklist, AC7110/14 and associated handbook. He is recognized as a technical

authority on materials testing (destructive and non-destructive), particularly in relation to Additive Manufacturing.

- **Dr. Margherita Cioffi, *Rina Consulting SpA***

### **“The European Roadmap for AM market implementation”**

#### Abstract:

AM-MOTION vision for 2030 foresees that Europe will improve its leading role in Additive Manufacturing, greatly impacting on the competitiveness of European industrial sectors and improving the quality of life of European citizens in terms of retention of high quality jobs in Europe, availability of customised, cleaner, safer and affordable products and increased access to cleaner energy, mobility and effective and personalised medicine.

In order to reach such a demanding target, AM-MOTION Roadmap highlights identified opportunities and challenges as well as specific technological and non-technological actions to be performed, in relation to target market, technologies and products, standardisation, certification, skills and education, financing, intellectual properties, safety, communication, cross-regional and international cooperation. AM-MOTION Roadmap focuses seven high-impact target sectors (i.e. Health; Aerospace; Automotive; Consumer goods and Electronics; Industrial equipment and Tooling; Construction and Energy).

#### Biography:



Dr Cioffi is PhD in a biomedical engineering at Politecnico di Milano, specialized in micro- and nano-systems for regenerative medicine and microfluidics for drug discovery. She has extended her research competences in several International institutes as Harvard-MIT Division of Health Sciences and Technology (Cambridge, US), EPFL (Lausanne) and the University Hospital of Basel. She is author of more than 40 scientific publications, 15 of which on high impact international peer-review journals. In RINA Consulting SpA, she has worked as project manager on several health and nanotechnology projects at European level (e.g. AXIS, NANO-HVAC, SUPCAM, FutureNanoNeeds), carrying out technical and knowledge management activities. She has been coordinator of NANO futures and Value4Nano CSAs. In AM-MOTION project, she is currently responsible of strategic roadmapping in additive manufacturing.

### **SECTION 3: Beyond the technological aspects**

- **Dr. Eurico Assunção, *Deputy Director, EWF***

### **“Skills needs and skills addressing for the European AM Industry”**

#### Abstract:

Europe is firmly committed to position itself at the leading edge of manufacturing innovation. Within the new technologies that are reshaping the industry, Additive Manufacturing (AM) stands out.

A challenge that remains to be addressed is qualified professionals capable of taking advantage of this technology and bridge the gap between job offers and job seekers.

As Europe seeks to retain its leading position in industrial competitiveness, there is an urgent need to establish a strategy for addressing Additive Manufacturing (AM) skills needs and shortage at European, National and Regional levels.

EFW, in collaboration with several organizations involved in AM, has been involved in EC funded projects, like CLLAIM, ADMIRE and, more recently, SAM. Projects that focus, not only, in identifying skills needs and shortages but in addressing them. Ensuring that the needs of industry in terms of qualified personnel are addressed.

#### Biography:



Dr. Eng. Eurico Assunção exercises as the Deputy Director in EWF since 2011 – European Federation for Welding, Joining and Cutting. Master in Mechanical Engineering from IST - Instituto Superior Técnico, and PhD in Laser Welding for the "Cranfield University", England, 2012. He is involved in the development of Qualifications and Training in Welding and Additive Manufacturing in collaboration with industrial and research organizations and in more than 40 European projects related to these topics. Since January 2018, Eurico is the Portugal National representative at ISO/TC261 on Additive Manufacturing and more recently was appointed as Convenor of ISO/TC261 JG74 – Personnel Qualifications. Invited Professor at Instituto Superior Técnico.

- **Andrew Imrie, Lloyds Register**

#### **“How Standards, Certification and Assurance are needed to bring AM parts to market”**

##### Abstract:

The technology and markets where AM is being considered as a disruptor is growing on an almost daily basis. Whilst most of the effort is being concentrated around the manufacture of the product, there is also a large amount of work being undertaken to provide assurance to the end user that the AM component produced is equivalent or better, to the part it is replacing, or that the innovative designs that AM is allowing to be manufactured can be sold on the open market and meet the current regulatory and code compliance.

LR has been involved in the development and writing of standards since 1760. Almost all the standards and codes we use today can trace their origins back to the original formats that we devised in the 1700's. We have continued to support both the development and use in many sectors. Some generic standards are available for use in the market along with company specific standards from larger OEM's, however it is not possible today to pick up any commercial standard and find a section on AM, which makes bringing

compliant products onto the market both challenging and time consuming, LR is working in a number of areas to get AM incorporated into standards, thus helping the route to market for industry.

Biography:



Overarching responsibility for the development and delivery of AM services for LR: Responsible for designing the products and services, commercial and support of the technical lead in creating value propositions. Contributed to the writing of guidance notes, external training and produced technical papers on AM. Represents LR as an AM technical consultant for due diligence, mergers, acquisitions, product development and the adoption of AM.

Role on the projects is to provide input to the various certification processes to provide a realistic overview that the certification is 'real world ready', support the work of the technical lead, provide input into the development of the certification and undertake reviews and support any associated activities.

- **Prof. Dinusha Mendis, *Intellectual Property and Innovation Law and Co-Director of the Centre for Intellectual Property Policy and Management (CIPPM), Bournemouth University***

**"An Analysis of the Intellectual Property Implications of the Development of Industrial 3D Printing"**

Abstract:

The presentation will provide an insight into the European Commission funded project titled '*An Analysis of the Intellectual Property Implications of the Development of Industrial 3D Printing*', led by Professor Dinusha Mendis of Bournemouth University together with partners from University of Glasgow UK, Added Scientific Ltd UK, University of Lapland Finland, Boehmert & Boehmert Munich Germany and Technopolis Group, Vienna Austria.

The project aims to provide an overview of the past and current industrial applications of Additive Manufacturing (AM) in selected sectors whilst identifying potential challenges and opportunities in need of clarification. In essence, the Study will aim to formulate a clear picture of the Intellectual Property (IP) framework that could enhance the competitiveness of the AM sector in Europe.

Biography:

Professor Dinusha Mendis is Professor of Intellectual Property and Innovation Law and Co-Director of the Centre for Intellectual Property Policy and Management (CIPPM) at Bournemouth University.



Professor Mendis is a leading expert in the field of exploring the Intellectual Property (IP) implications of 3D Printing. She led and completed a Commissioned project for the UK Intellectual Property Office on this topic in 2015 and is currently the Project Lead for a European Commission funded project exploring industrial 3D printing and IP implications. Her co-edited book (with Professor Mark Lemley and Professor Matthew

Rimmer) titled *'3D Printing and Beyond'* is due for publication by Edward Elgar in 2018. She regularly delivers invited talks on this topic and has spoken at academic institutions, for blue-chip industry clients, at the European Parliament and at the EUIPO, amongst others.

#### **SECTION 4: The international dimension**

- **Dr. Hideki Kyogoku, *Professor, Faculty of Engineering, Kindai University, Japan. Technology Research Association for Future Additive Manufacturing (TRAFAM), Project Leader***

#### **"The Latest Actions of Technology Research Association for Future Additive Manufacturing (TRAFAM)"**

##### Abstract:

Additive manufacturing (AM) technology has been dramatically attracting attention as a breakthrough technology in advanced manufacturing. The Ministry of Economy, Trade and Industry (METI) of Japan established Technology Research Association for Future Additive Manufacturing (TRAFAM) to develop AM technology, in FY2014. The members of TRAFAM include three academic institutions and 29 companies. The association's mission is twofold; to develop metal AM system technology and to develop binder jetting equipment for the rapid production of sand moulds. The goal of TRAFAM project is the development of innovative metal Additive Manufacturing systems that will meet the world's highest standards and the development of manufacturing technologies for high value-added products of any complicated shape, for aerospace, medical, and transportation industries etc. In the presentation, the latest actions of TRAFAM are introduced.

##### Biography:



Professor Hideki Kyogoku, Faculty of Engineering, Kindai University, is a Councillor of Kindai University and a Fellow of the Japan Society of Mechanical Engineers. He obtained a Doctor of Engineering degree in Mechanical Systems Engineering from Tokyo Institute of Technology in 1989. He worked at The University of Texas at Austin as a visiting research associate during 2001-2002. He founded the Advanced Additive Manufacturing Research Center at Kindai University, Hiroshima, in 2014 as its Director since then. He served as Vice-Dean of Faculty of Engineering during 2004-2008, Director of Research Institute of Fundamental Technology for Next Generation during 2007-2011, and Dean of Faculty of Engineering during 2008-2014 at Kindai University.

- **Prof. David W. Rosen, *The George W. Woodruff School of Mechanical Engineering Georgia Institute of Technology***

## “The International Dimension: AM Strategies in Singapore and the United States”

### Abstract:

Investments in AM, and advanced manufacturing in general, by countries around the world have increased significantly in the past 10 years. In this talk, I provide perspectives on two countries – on opposite sides of the world – regarding investment and technical strategies related to AM. Singapore has a highly coordinated economic development program that has been applied to AM, with investments in local universities, research institutes, and local companies. Much, but not all, of the efforts are in applied R&D with significant support for pre-commercialization activities. Singapore industries with the most AM activity include aerospace, medtech, precision engineering, and marine & offshore. The US is, of course, much larger, but the level of AM investments is not much greater. Leveraging its large R&D infrastructure, the US has a more balanced approach with more attention on up-stream, basic research, compared to Singapore. The US government’s Departments of Commerce, Defense, and Energy all fund research in AM, in addition to the National Science Foundation and, to a lesser extent, the National Institutes of Health. Additionally, the recently formed National Network for Manufacturing Innovation institutes program, in which the America Makes institute focuses on AM, channels investments from the Departments for applied research at companies and universities. Thoughts on the outlook for AM strategies will be offered.



### Biography:

David Rosen is a Professor in the School of Mechanical Engineering at the Georgia Institute of Technology. He is also the Research Director of the Digital Manufacturing and Design research center (DManD) at the Singapore University of Technology and Design, having spent the past 2 years there. He received his Ph.D. at the University of Massachusetts in 1992 in mechanical engineering. His research interests lie at the intersection of design, manufacturing, and computing with specific focus on additive manufacturing, computer-aided design, and design methodology. He is the recipient of the 2013 Solid Freeform Fabrication Symposium, International Freeform and Additive Manufacturing Excellence (FAME) Award and the co-author of a leading textbook in the AM field.

## SECTION 5: The regional dimension

- **Franck Simon, *Responsible "Procédés Avancés de Fabrication" and "Ingénierie Des Surfaces", ViaMeca***

## Example of a regional structuring on the additive manufacturing sector for the realization of innovative projects

### Abstract:

Additive manufacturing (or 3D printing) is a recent technology to compare "traditional" manufacturing processes. Many fields remain to be explored and are as many avenues of innovation (materials, parts design, processes, post-treatments ...). Research centers, laboratories and technical centers work on these topics of research and development, and this, for all materials impacted by these new technologies (metal, polymer, ceramic ...). Manufacturers in many sectors of activity are also very interested in the opportunities and new markets offered by these new processes with the aerospace industry, medical, luxury and jewelry, plastics. There may still be a lack of synchronization between industrial developments / demands and academic research axes.

Initiative 3D was created 2 years ago to answer these questions and provide concrete answers to industry, this structuring is achieved with the support and support of the Auvergne Rhône Alpes region. The objectives of Initiative 3D are multiple: coordination of research axes in the regions, rationalizing the investments of equipment and machines (co-financed by the public authorities), being a unique interlocutor for the industrialists in order to bring them the most adapted answers, to make collaborative industrial projects / laboratories emerge with a co-financing region / state / Europe, to be the interface with the public authorities (metropolises, region, state, Europe). This presentation will show the progress of this structuring, the actions already carried out, as well as future opportunities and partnerships with other European actors.

#### Biography:



Mr. Simon is a materials engineer and is the thematic manager for the ViaMéca cluster processes. He has great expertise in project management as well as in the implementation of industrial projects. It cooperates closely with the industrialists and laboratories for the assembly of these projects. He leads the RAFAM (AM metallic) and Initiative 3D (AM all materials) networks in the Auvergne Rhône Alpes region, in close collaboration with the regional and national public authorities.

Leader of industrial networks, academics and technical centers on additive manufacturing. Active member of the European networks Initiative Vanguard and EFFRA.

- **Coen de Graaf, Project leader "Vanguard Initiative", Brabant Province, The Netherlands.**

#### **Strategic (inter-)regional collaboration on AM: partnerships, clusters & sme's**

##### Abstract:

As one of Europe's leading innovative regions in manufacturing of high complex, low volume products and parts mainly for the high-tech industry we are facing the challenges and opportunities of digitization of the industry and new (production) technologies. In order to keep our position as innovative region we carry out an active strategy to speed up the uptake of new technologies and improve our competitiveness. This strategy covers the integrated implementation of our Industry 4.0 agenda, we call "Smart Industry".

Additive manufacturing is a relatively new technology in addition to- or replacing "traditional" manufacturing processes. Before the industry, and in particular the SME's are ready to implement any kind of this new technology, a lot of concerns and reluctance have to be overcome. Questions in relation to materials, design, pre- and post processing, automation, transfers, quality control and certification are to be addressed. By investing in an "Innovation program" Brabant Province supports the collaboration between Research centers, fieldlabs, technical centers and companies on these topics. All stakeholders are concentrated on our four campuses in the Brainport area (Eindhoven), on 10 km<sup>2</sup> where we locate a Design Campus Strijp S/T: Design & Craftsmanship / Dutch Design Week, an R&D campus TU/e-Campus Knowledge, R&D KSF: Education, Publications, Valorisation, High Tech Campus Eindhoven: Product development, R&D, lab facilities KSF: Patents, New Business Creation, and a "Makers" campus Brainport Industries Campus: Manufacturing & Industrialisation KSF: Quality, Logistics, Technology, Cost.

On the Brainport Industries Campus we focus on the development and industrialisation of the "Factory of the Future" through a close collaboration of eight Fieldlabs / technology centres. The Fieldlabs "Multimaterial 3D" and "Addfab- (metalprinting)" are responsible for developing, industrialising and integrating Additive manufacturing technologies in the manufacturing industry and by nature are an important part of this eco-system. One objective of these Fieldlabs is to lower the thresholds for SME's for uptaking new technologies like AM. In this presentation we will inform you about our approach and how we link to European initiatives for interregional collaboration.

Biography:



Mr. Coen de Graaf is projectleader at the Province of Brabant (regional public authority) on Hightech Innovation and co-leading the Datafication-program of the region. He is also strongly involved in interregional partnerships like Vanguard and Manunet. Within the Vanguard initiative he is co-leading projects on Additive manufacturing and Efficient & Sustainable manufacturing. He has great expertise in strategy development, project management and implementation of change - management. Besides his role at the Province of Brabant, he is the national coordinator for the Human Capital Agenda of the High Tech sector in the Netherlands.

**SECTION 6: Key AM projects**

- **Sebastian Bluemer, Development Engineer Additive Manufacturing, GKN Sinter Metals**

**"On the industrial view on technology developed in Supreme"**

Abstract:

Industrial application of Additive Manufacturing Technologies (e.g. laser powder bed fusion), requires high capabilities regarding process robustness, material properties and part quality within the different areas of application (e.g. industrial, automotive). The variety of suitable materials for LPBF process depends on

the material's specific properties, such as welding temperature, oxygen content and heat conduction. Hard to weld materials may require changes to the processing route, e.g. pre-heating of the build chamber to reduce stresses and prevent cracks. High carbon steel is a hard to weld alloy, which could be valuable for many applications (e.g. aftermarket and spare parts) in automotive industry. In Supreme GKN focuses on processing low steel alloy powders with a predefined carbon content by using a modified pre-heating atmosphere and water atomized powders. In order to achieve a competitive position in the automotive market, high production rates and low powder costs are a crucial influencing factor. This presentation will show the results of the current process development for high carbon steels and present a proper use case to implement AM manufacturing strategies within automotive industry.

Biography:



Sebastian Blümer works as a Development Engineer Additive Manufacturing within the GKN Powder Metallurgy company. He has contributed to the qualification of a serial production AM system from beta to zero series status, so that an autonomous printing of AM-Prototypes within the GKN pilot plant is feasible. Besides the serial production topics, the process development of new materials such as high carbon steels on modified laser powder bed systems is also within his field of work. Furthermore, he focusses, together with a team of digital experts, on LPBF process data digitalization to fulfil process-monitoring requirements along the AM process chain.

- **Julian Bajolet, Head of Research Additive Manufacturing Program ,IPC**

**“MAESTRO project presentation and contest”**

Abstract:

MAESTRO is a project dedicated to metal additive manufacturing. The objectives are reducing production time and producing high quality products by leading towards zero defect. To these ends, the project acts from the pre-process software to the manufacturing of parts and integrate in-line monitoring systems and hybrid manufacturing.

Biography:



Dr. Julien BAJOLET (Male) is Head of Research Additive Manufacturing Program at IPC. With an engineer's degree in Mechanical from ENIM and research Master degree from UPVM in 2011, he joined the SAFRAN group for a PhD in collaboration with the LaBPS laboratory. Since 2015 at IPC, he is in charge of the additive manufacturing research program for metal, polymer and composites for collaborative program and private R&D. He also realizes training about conformal cooling and additive manufacturing.



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