SASAM
Standardization in Additive Manufacturing

SEVENTH FRAMEWORK PROGRAMME

Project no.: **319167**

Project acronym:

SASAM

Project full title:

Support Action for Standardisation in Additive Manufacturing

Call: FP7–NMP–2012-CSA-6

Start date of project: 1 Sept 2012 Duration: 18 Months

Title: Project Summary document

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Partners also contributed in writing: -

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1. Summary

Summary description of project context and objectives

SASAM's mission is to drive the growth of AM to efficient and sustainable industrial processes by integrating and coordinating Standardisation activities for Europe by creating and supporting standardisation in the field of AM.
Even if the mechanical and materials properties of todays AM products are on an adequate level for commercial use, the lack of availability of an International and European Standard is hampering real industrial implementation of AM technology. The development of corresponding Standards is an important step to improve the current situation, and make the benefits of additive manufacturing accessible and useful for manufacturing purposes to numerous sectors of industry.
Specific objectives of SASAM include the following:
- Setting up a European wide structure with national nodes of AM experts (Industry and RTDs) together with National Standard Bodies.
- Provide an updated/aggregated roadmap for AM scoping/including the challenges for Standardisation.
- Identification of and preparation of Working Groups / Work items in the areas of relevant AM standardisation items which apply to the design, fabrication and assessment of parts produced by additive fabrication
- preparation of a first draft guideline / framework of a normative document on the above work items
- Organise Industrial information days on AM Standardisation – Dissemination

Description of work performed an main results

SASAM started by identifying the stakeholders and key players in the area of standardisation of Additive Manufacturing to learn and understand their view of the AM market as well as the needs for and the probable effects of standardisation. This info was combined with information from existing roadmaps and vision statements for sectors that have a strong link to Additive Manufacturing (such as the Strategic Research Agenda from the AM-Platform). In the WP2 the real Roadmap for AM standardisation was developed which clearly shows the vision and priorities of the industry and the steps required to transform the vision of a standardization that foster innovation and development of AM into reality. The Additive Manufacturing Standardisation Roadmap (a SASAM only as well as a public document was draft) is a proactive document, which describes a vision for the Additive Manufacturing industry. The Roadmap lists the key elements that need to be put in place to ensure that the industry can reach full implementation of standards in AM, to transform it into a controlled and accepted technology for industrial manufacturing alongside the already established conventional technologies.
Four focus areas were identified, each of them populated by individual Working Groups. They comprise: Terminology, Methods – Processes – Materials, Test methods and Data processing
The dissemination work package created and extended awareness of and an interest for Standardisation for Additive Manufacturing as well as brought partners from the whole value chain together in order to initiate and establish appropriate and necessary contacts for further interaction. Therefore, a platform to raise interest in an industrial standard for Additive Manufacturing outside the already established community was created by setting up a website www.SASAM.eu and several workshops + Conferences in combination with CEN (STAIR-AM initiative) were held.

Expected final results

One of the key final results is a Standardisation roadmap, based on input from 102 relevant stakeholders, which can be used as a background structure for a European Standard, a Technical Specification or a Technical report. The roadmap comprises context and background of AM, an explanation on how can standards support industrial implementation of AM, an overview of relevant existing AM standards and which existing relevant standards from other sectors do fit and which gaps exist. Also a description of and priority list of which standards are (to be developed) to help/assist industry to be more compliant is provided. Input from stakeholders is presented in terms of requirements, wishes, priorities and a roadmap is given.
A background structure for a European Standard, a Technical Specification or a Technical report was drafted which can be used for norming institutes to actually write the standards.

The other main impact is that a liaison of SASAM activities with the norming institutes is established: national as well as CEN and ASTM involvement is included to secure linking with EU standardisation policies. From now on, Standardisation will be a standard element of the AM-Platform meetings agenda to keep close track with the AM stakeholders needs and requirements.

2. Project Objectives for the period

WP1 Stakeholders / scoping of requirements

This work package will identifying stakeholders and their business areas and providing a summary of their AM standardization vision, targets and requirements for their key application areas. Scoping of a general overview of AM standardization requirements.

Project objectives for the period:

O1.1 Organizing a network event and creating a network for information on standardization activities of Additive Manufacturing and the implementation of Additive Manufacturing Standards into the European and international industry.
O1.2 Creation of a stakeholders & requirements document which summarizes the vision, targets and requirements for AM standardisation.

D1.1 Map of principal AM stakeholders and their visions

Work progress and achievements during the project period

Based on the contacts from the SASAM partners, a mapping of relevant companies, clusters and institutions in the fields of AM was made and they were provided with a questionnaire regarding their views on the needs, requirements and probable effects of an international standard for AM technology. The response to the questionnaire was followed up by a face-to-face meeting between members and stakeholders. The goal was to get a complete overview on the principle stakeholders in the field and to analyse present visions, targets and on-going actions in the area of standardisation.

Significant results

With respect to the mapping of companies, clusters and institutions we have sent out a questionnaire to about 900 stakeholders of which 102 relevant responses were received back, which is quite significant.

The main results regarding the needs for standardisation issues referring to Additive Manufacturing can be summarised as follow:

1. Standards are in use by the most of the participants
2. There is a need for AM standards
3. The needs resp. the requirements of the customer are main drivers for using standards also for upcoming AM standards
4. There is a wish for global international standards
5. The main addressed topics for AM standards are materials; processes/methods and test methods
6. The reliability of machines and processes are expected as a result of standards
7. The dominate remarks of why there is a need of standards are quality or qualification (system qualification; part quality, quality control)
8. Market opportunities are direct related to future standards

Furthermore topics are mentioned by remarks:

9. Specific standards and restrictions of branches e.g. the medical or the aeronautics sector influence the manufacturer of parts and it is a consequence to consider this for AM standards
10. Safety regulations are missing and are a must for AM standardisation; additional to this Environment issues are another similar topic that is in the focus of the stakeholders
11. Part quality assurance
12. Education seems to be an important issue that can be influences by standards
13. New processes for AM e.g. laser cladding should be considered

- *No deviations from Annex I*
- *No deviations from the planned use of resources.*
- *No corrective actions proposed.*

D1.2 Network event and one workshop and AM standardization information network established

Work progress and achievements during the period

The creation of networks contributes to enhance the sustainability of the project objectives in the long term and improve its replication availability. In order to integrate the opinion of all stakeholders, the participation of all industries at events is a must. Thus, SASAM organized a network event and workshop and also was presented and discussed at many other stakeholders' events.

Significant results

SASAM was presented at lots of events. A listing is provided below

Date	Place	Format	Event	Title	Partner
2012.12.17	Brussels	Workshop	JRC & European Commission - Third Foresight study on AM Industrial Landscape Vision of 2025(ILV2025)	How will standards facilitate new production systems in the context of EU innovation and competitiveness in 2025	UNM
2013.01.16	Atlanta Georgia, USA	Meeting	ASTM F42	Just presented the essential content of the project using material from the SASAM Kick-off meeting	SINTEF
2013.04.02	TINE, Trondheim	Planning & Review Session	SFI Norman	Hybrid manufacturing: achievements so far and future plans	SINTEF
2013.06.10	Trondheim	Industrial seminar	Sandvik	Background & Hybrid Manufacturing – combining subtractive and additive manufacturing techniques	SINTEF
2013.06.25	Paris	Presentation	18th European Forum on Additive Manufacturing	Europe, Etats Unis, international: la normalisation en fabrication additive fixe ses priorités	UNM
2013.09.03	Veldhoven	Conference	Rapid Pro 2013	Wat is de norm voor additive manufacturing?	Printed Jewelry
2013.09.19	Stockholm	Seminar	AM- DAGEN	AM in Metals: An Overview of Processes and Materials	SINTEF
2013.10.02	Naples	Technical Committee	CEN/TC 153	TC for Food processing machinery - Safety and hygiene specifications	NEN
2013.11.19	KTH	Lecture	Royal Institute of Technology	Additive Manufacturing: A brief overview and current development for a new industrial revolution	SINTEF
2013.20.25	Stockholm	Seminar	AM DAGEN	Additive Manufacturing: Going from "Rapid Prototypes" to an Industrial Manufacturing Method	SINTEF
2013.06.13	Brussels	Meeting	12th AM Platform meeting	12th AM Platform meeting	TNO c.s.
2013.03.08	Brussels	Kick-off Meeting	STAIR- AM	STAIR Platform on AM	CEN-CENELEC
2013.10.07	Gran Canaria	Livestream	Webinar	Challenges on Standardisation in AM	ULPGC
2014.02.04	Barcelona	Workshop	IMS workshop	Manufacturing Trends Standardisation for Additive Manufacturing	TNO
2014.09.03	Veldhoven	Conference	Rapid Pro 2014	What's the deal with standardisation and AM? http://www.rapidpro.nl/programma/program-and-downloads-thursday-27-february-2014*/*	Printed Jewelry

• *Deviations from Annex I: the original deliverable was planned for M4, however postponed to M13 to incorporate more events.*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed.*

D1.3 AM standardization requirements document.
In order to develop a roadmap which is based on stakeholders input, the questionnaire was sent out and results were processed. The group of parties interviewed comprised the following:
The stakeholders consisted of:

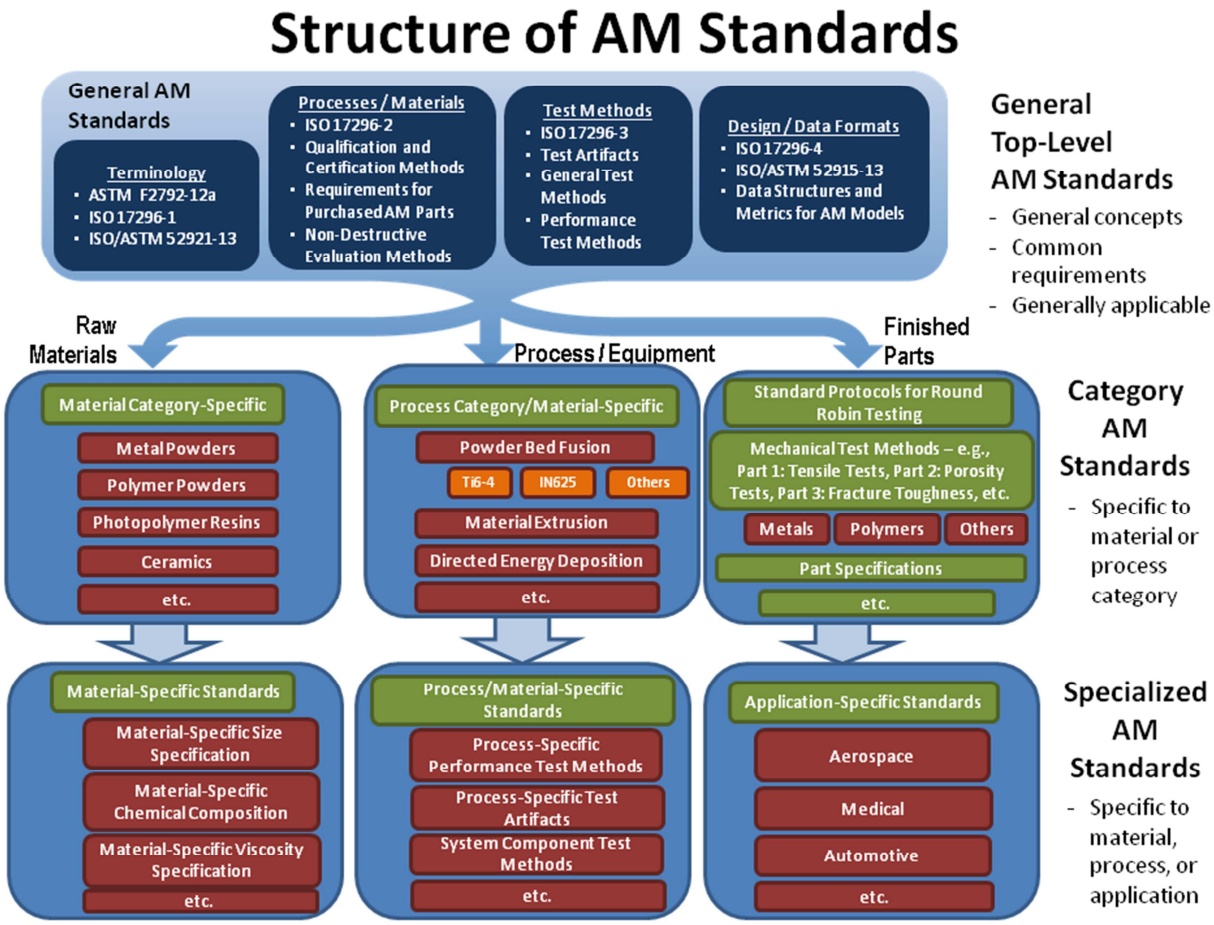
- Members of the Steering Committee (SASAM Partners)
- Industry
- Additive Manufacturing Associations and Federations
- Chambers of Commerce
- Universities
- RTD companies and Platforms
- Standard bodies (European and international)
- Public Bodies
- Magazines and Publications
- Project Contacts

Significant results

The requirements from the stakeholders as well as the complete list with names are described in this D1.3. In order to do this most effectively, a team was organized to provide the report describing needs and expectations that has been found via the questionnaire and during the networking events. The document was also input for WP2. From the inventory of standardization requirements among relevant stakeholders the following conclusions were drawn:

- Build a set of Additive Manufacturing standards according to a two level approach:
    1. A set of "Top level" standards covering fundamental topics
    2. A set specialized of detailed topics and applications.
- The top level standards should comprise:
    Terminology, Processes, Test methods and Data Exchange
- The detailed topics should include, but not necessarily be limited to:
    Terminology: Coordinate systems
    Processes: Specification on laser sintering of PA12, PEEK etcetera
    Test methods: Tensile test, fatigue test etcetera (liaise with existing standards where ever appropriate)
    Data exchange: a.o. AMF format
    Design
    Specific industrial needs
    Part quality
    Safety (regulations)
    Education
- Liaise with existing TCs and standards where ever appropriate
- SASAM will work in line with the structure decided by ISO/TC261.
- Standards are to be drafted according to content and format provided by UNM presentation, posted on the SASAM website (reference ISO 10241-1 and ISO Rice model / version 2.1 / 2007-08-15)
- Other standards might be needed on customer requirement

A proposed structure of standards is given in the figure below, comprising Top level as well as detailed topics



A proposed structure of standards

• *Deviations from Annex I: the original deliverable was planned for M6, however postponed to M10 to incorporate more interview results.*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed.*

MS1 AM standardization requirements available

This milestone is identical to the achievement of D1.3. Details of the milestone are given (D1.3) above.

• *Deviations from Annex I: the original Milestone 1 was planned for M6, however postponed to M10 to incorporate more interview results.*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed.*

WP2 Roadmap for AM standardization

The overall objective of WP2 was to create the roadmap for standardisation of Additive Manufacturing technology, which will clearly show the vision of the industry and the steps required to transform the vision of a standardization that foster innovation and development of AM into reality.
The Additive Manufacturing Standardisation Roadmap is a proactive document, which describes a vision for the Additive Manufacturing industry. This vision is based on input from key industry players via the activities of the SASAM project itself (WP1) and using existing roadmaps and vision statements for sectors that have a strong link to Additive Manufacturing (such as the Strategic Reseach Agenda 2014 from the AM-Platform).

Project objectives for the period were:

O2.1 Identify and review relevant activities and roadmaps from industrial sectors and norming institutes that are likely to be stakeholders in the standardization of Additive Manufacturing Technology and evaluate their relevance and possible contribution to an overall Additive Manufacturing Standardisation roadmap.
O2.2 Transform the outcomes of WP1 (D1.1) and combine with other roadmaps (D2.1) into elements of the overall Additive Manufacturing Standardisation roadmap.
O2.3 Gather feedback, finalize and publish the overall Additive Manufacturing Standardisation roadmap

D2.1 Relevant information from other roadmaps available

Existing roadmaps and activities from the industrial sectors that are the most important to AM were collected and analysed and summarized according to a fixed template. This existing knowledge formed the starting point for our SASAM Roadmap. 25 documents were so far been nominated and the most important points from each document have been extracted and highlighted in the evaluation template. Documents and evaluation templates have been made available through SASAM's website.

Significant results

The following list of evaluated documents were nominated as relevant for AM standardization and analyzed

Doc. Nr.	Publisher: Institute behind the document	Name of document
1.	Air Force Research	Additive Manufacturing of Aerospace Alloys for Aircraft Structures
2.	Science and Technology	Additive Manufacturing: Status and Opportunities
3.	Additive Manufacturing	Additive manufacturing: Strategic research agenda 2011, A future vision for AM
4.	European Commission	Factories of the future PPP, Strategic multi-annual roadmap
5.	Joint Research Centre	Industrial landscape vision EU – Draft
6.	Additive Manufacturing	Platform on Rapid Manufacturing (RM), vision on 2020 for RM
7.	Naval Air Warfare	RARE Parts through RM&R, Additive Manufacturing: State of the art 2010
8.	The University of Texas	Roadmap for Additive Manufacturing, Identifying the future of Freeform processing
9.	NIST ASTM F42	A strategic approach to organize ASTM F42 standards
10.	NIST Workshop	Additive manufacturing: Standards and other international trends
11.	EU Joint Research	How will standards facilitate the context of EU innovation and competitiveness in 2015?
12.	DMRC, University of	Expert survey on current and future requirements on direct manufacturing technologies 2012-
13.	DMRC, University of	Expert survey on current and future requirements on direct manufacturing technologies,
14.	NIST Workshop	Workshop scope and objectives

15.	NIST Workshop	Manufacturing the road to success
16.	NIST Workshop	Report of the break-out group for Quality and Certification
17.	NIST Workshop	Report of the break-out group for Modelling and Simulation
18.	NIST Workshop	Report of the break-out group for AM Materials
19.	NIST Workshop	Report of the break-out group for Process Equipment
20.	NIST Workshop	NIST White papers: Measurement Science for metal based AM
21.	NIST Workshop	NAMII: Priority Applied Research Needs
22.	UK AM Special Interest	Shaping our competency in additive manufacturing
23.	UK Big Innovation	Three Dimensional Printing Policy: Why Britain neds a framework for 3D printing
24.	ISO	European (international) standards for fusion welding
25.	ASTM	Standard specification for Additive Manufacturing File Format (AMF)

• *Deviations from Annex I: the original Deliverable was planned for M6, however postponed to M10 to incorporate more literature results.*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed.*

D2.2 First draft version of AM standardization roadmap open for public feedback

A key element in the roadmap is a common vision of the future industrial standards for Additive Manufacturing technology.

This will be realized primarily by interviewing of and liaison with European AM standardisation stakeholders (as identified in D1.1) and in coordination with ISO/TC261. In addition to that collaboration with ASTM F42 and the recently initiated CEN/CENELEC STAIR-AM platform for additive manufacturing was established which enlarged the group of stakeholders.

Significant results

Three principal tasks were conducted:
1. Gather and evaluate information from other relevant roadmaps and most important development within this sector.
2. Transform the outcome and conclusions from this information gathering as well as the stakeholder and requirements survey from WP1 into elements in a first draft for an AM standardization roadmap.
3. Gather feedback, finalize and publish the roadmap for standardization for additive manufacturing technology.

With this joint plan and working principle, SASAM, ISO TC261 and ASTM F42 reached several key agreements on the guiding principles to be followed and pursued by both organizations, including the following:

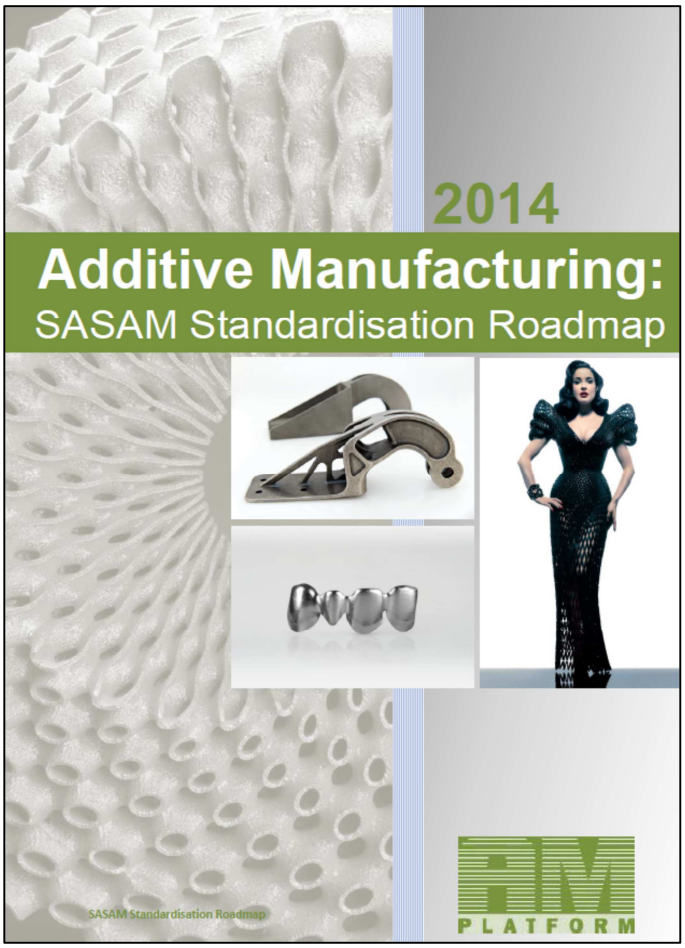
- One set of AM standards – to be used all over the world
- Common roadmap and organizational structure for AM standards
- Use and build upon existing standards, modified for AM when necessary
- For efficiency and effectiveness, ISO TC261 and ASTM F42 should begin the work together
- and in the same direction
- Emphasis on joint standards development

• *Deviations from Annex I: the original plan did not incorporate the input from the CEN/CENELEC STAIR-AM platform nor the link with the ASTM F42. SASAM partners consider this as an increase of the stakeholder input as well as a big step forward for the visibility of SASAM in the world. Originally planned for M10, however postponed to M12 to incorporate abovementioned platforms.*
• *No deviations from the planned use of resources.*
• *No corrective actions proposed*

D2.3 Final version of roadmap for AM standardization
When the most essential elements have been identified and incorporated into the first version of the roadmap, a second version was delivered which was published in order to gather public feedback from a wider audience.

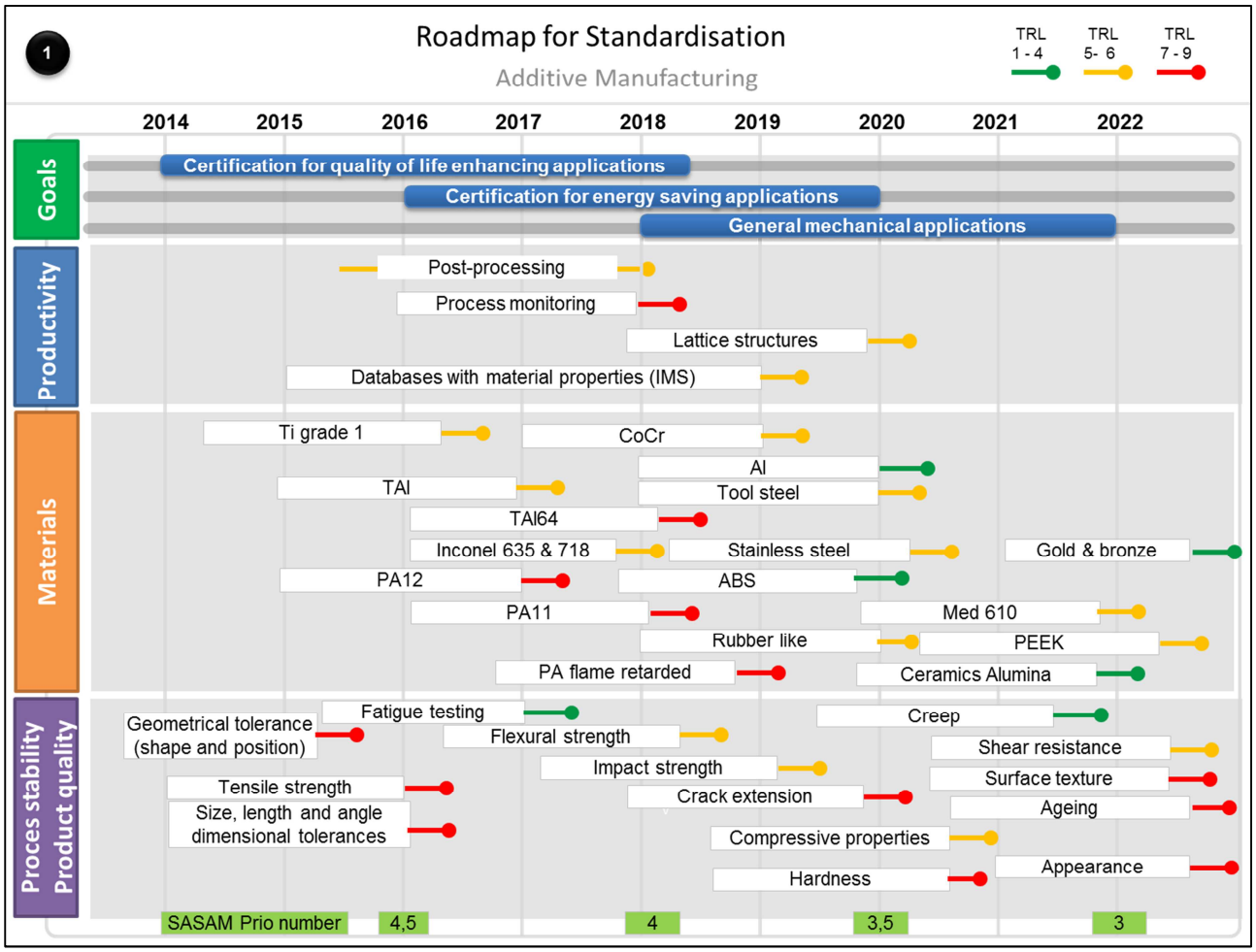
Significant results

Based on feedback, the first version of the roadmap was subject to further iteration and then finalized. The finalized roadmap was published and is an open document. The front page is given below and is aligned with the other document AM-Strategic Research Agenda 2014.



Contents of the open roadmap (downloadable from www.SASAM.eu and www.AM-Platform.com is:
1. Summary / Executive Summary (for the separate open document)
2. Introduction to AM standardisation
3. Standards to support industrial implementation of AM
4. Existing standards for AM
5. Existing standards from other sectors relevant to AM
6. Input from AM standardization stakeholders
7. AM standardization documents analysis and proposed structure of standards
8. Benefits for AM that can be achieved by using standards
9. Relevant projects & initiatives
10. SWOT analysis of AM from a standards point of view
11. Red brick walls (principle challenges)
12. Prioritization (high prio topics) and Roadmap (timeframe)
13. Conclusions
14. References

An impression of the roadmap section, describing the topics and timeline is given below.



• *Deviations from Annex I: Originally planned for M12, however postponed to M17 to enable better consultation with stakeholders.*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed*

Note: in the meantime this open document has gained worldwide attention and is referred to in many occasions.

MS2 Relevant information from other roadmaps available

This milestone is identical to the achievement of D2.1. Details of the milestone are given (D2.1) above.

• *Deviations from Annex I: the original Milestone 2 was planned for M6, however postponed to M10 to incorporate more interview results.*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed.*

WP3 Standardisation / Norming / Elaboration of Work items

WP3 contributed to establishment of a European standard for Additive Manufacturing. Depending on the initial stage of development present, it was considered to prepare a background structure for a European Standard, relevant input to a Technical Specification or a Technical report.
The Standardisation roadmap from WP2 was used as input as well as input from partners participation in ongoing activities of the National norming committees UNM, NEN, DIN and ISO/TC 261 and ASTM. Four focus areas were identified, each of them populated by individual Working Groups. They comprise: Terminology, Methods – Processes – Materials, Test methods and Data processing.

Project objectives for the period were:

O3.1 Scope and identify standardisation activities for each of the WG from the Standardisation roadmap
O3.2 Organise 3 Working Group meetings to elaboration new work items, prepare content and achieve consensus
O3.3 Prepare a first and second draft of a European Standard in their WG area*)

*) Note: while the project was running, after close discussions with the standardization bodies involved, it became clear that only standardisation bodies are mandated to write the official standardization documents. So the initial phrasing of D3.3 in the DOW was not correct. It was changed to “Guidelines for the development of the EU standards in Additive Manufacturing”.

D3.1 Scoping and derive standardisation activities for the Working Groups
Formation of the Working Groups of partners based on the Standardisation roadmap D2.3, was followed by scoping and derive standardisation activities for the Working Groups. The three Working Groups dealt with the following topics:
- Standardisation on terminology of Additive Manufacturing
- Standardisation of methods, preparation, processes, post processes, productivity
- Standardisation of samples for test methods and for machine qualification
- Standardisation of data processing within the supply chain of Additive Manufacturing and in and output materials of additive manufacturing

Significant results

The document D3.1 presents the activities and the status of the different working groups in WP3.
The objective of this WP was to scope and identify the most urgent standardisation activities for additive manufacturing technology. This means that WP3 produced (guidelines for) Technical Specifications and write a summary of the standards for additive manufacturing that have been identified as being the most urgent to develop. Three working groups were defined:

- WG 1: Design, leader: TNO
- WG 2: Materials and process, leader: Layerwise
- WG 3: Test Methods, leader: VIAMECA

The modus operandi for each working has been:
1) Define topics with the help of the roadmap under development in SASAM WP2 and the existing AM standards (ISO & ASTM)
2) Collect information linked to the topics, from technical and scientific articles, books, existing working groups etc., to create the references required for the standardization. This work includes the evaluation of the maturity of the items collected (to know if the technical information available is relevant for a standard) and also to identify the specialists which could be involved in the future work groups for development of the new standards.
3) Define the requirements for the standards for the relevant items
The full report can be found in the deliverable D3.1. It needs to be noted that the deliverable provides the following annexes:

Annex I WG1: 1st draft of Design Guidelines for Additive Manufacturing
Annes II WG1: collected references which is an extensive list of relevant documents and internet sources with direct links to the relevant articles.

The Annex II is depicted below.

Design guidelines for Additive Manufacturing with metals

Documents and internet sources

Organisation	site / titel / document	Short cut	Availability for SASAM Y/N	remarks	significance 1=very high 4=low
Univ. Texas **I. Gibson, G. Goenka, R Narasimhan, N Bhat**	Design Rules for Additive Manufacturing	http://utwired.engr.utexas.edu/lff/symposium/proceedingsArchive/pubs/Manuscripts/2010/2010-59-	x	SLS, Incl. mechanical aspects	2
Book **ISBN-10: 384732294X**	Book Tom Page: Design for Additive Manufacturing: Guidelines for cost effective manufacturing	-			2
Loughborough	Campbell (2011) - Development of a Repository to Support Design for Additive Manufacturing (DfAM)	http://www.ciri.org.nz/conference3/papers/NZRPD2011%20-%20Campbell.pdf	x	presentation on design	1
Loughborough **Prof Richard Hague**	Exploiting the Design Freedoms of Additive Manufacturing for Light-Weighting and Multi-functionality	http://www.jwi.hw.ac.uk/documents/2011_JWI_Conf_Haugh.pdf		presentation	
GPI Prototype & Manufacturing Services	Conformal Cooling Using DMLS	http://beta.rodpub.com/public/uploads/365258Conformal040212final.pdf			
3D Systems	Rapid Manufacturing SLS Design Guide - Plastics	http://www.3dsystems.com/company/datafiles/SLS_Guide.pdf			
Mike Ayre on 07 November 2012	Energy Efficient DMLS parts: A practical guide for designers	http://prezi.com/4gnoki3-ieyu/saving-dmls-design-guidelines-v2/			1!
S Maidin and R I Campbell **Loughborough Design School**	Development of a Repository to Support Design for Additive Manufacturing (DfAM)	http://www.ciri.org.nz/conference3/papers/NZRPD2011%20-%20Campbell.pdf		Presentation	
By Jim Comb, Stratasys, Inc.	How to Design Your Part for Direct Digital Manufacturing	http://www.stratasys.com/~/Media/Main/Files/White%20Papers/SSYS-WP-DesignForDDM-1-12.aspx		Article	
Fraunhofer Institute for Laser Technology ILT, Aachen, Germany **Konrad Wissenbach**	PresentationofEC Project FANTASIA	http://www.cdti.es/recursos/doc/eventosCDTI/Aerodays2011/4C2.pdf		presentation	
Wilhelm Meiners **Fraunhofer Institut für Lasertechnik, Aachen**	Selective Laser Melting: Generative Fertigung für die Produktion der Zukunft?	http://www.produktion.nrw.de/fileadmin/Dokument/Downloads/20120321_ILT_OptischeTechnologien.pdf		presentation	
Advanced lattice support structures for metal additive manufacturing, Ahmed Hussein , Liang Hao, Chunze Yan, Richard Everson, Philippe Young. **College of Engineering, Mathematics and Physical Sciences, University of Exeter, Exeter EX4 4QF, Devon, United Kingdom**	Support design	http://www.sciencedirect.com/science/article/pii/S092401361300037X			
Marc Jobin, Raphael Foschia **hepia, University of Applied Science HES-SO, 4 rue de la Prairie, 1202 Genève, Switzerland** **Guillaume Vansteenkiste** **Pôle Européen de Plasturgie (PEP), 2 rue P. et M. Curie - 01100 Bellignat, France**	Topography and optical properties of polished laser melted Maraging Steel, Cobalt Chromium and Inconel 718	http://www.binc.biz/news_up/RC2-surface-final.pdf		Material properties and structure	
Tim Ruffner – VP New Business Development / Marketing Manager **GPI Prototype & Manufacturing Services, Inc.** **940 North Shore Drive** **Lake Bluff, IL 60044** **(847) 615-8900**	Conformal Cooling Using DMLS	http://beta.rodpub.com/public/uploads/365258Conformal040212final.pdf		Design of cooling chanels	
Jack Wu EOS GmbH Electro Optical Systems **Andrew Hsu CoreTech System Co., Ltd**	Direct Metal Laser Sintering Technology Applications on Conformal Cooling System Development	http://www.moldex3d.com/en/assets/2012/01/Direct-Metal-Laser-Sintering-Technology-Applications-on-Conformal-Cooling-System-Development.pdf		Design of cooling chanels	
I. Gibson, G. Goenka, R Narasimhan, N Bhat	Design Rules for Additive Manufacture	http://utwired.engr.utexas.edu/lff/symposium/proceedingsArchive/pubs/Manuscripts/2010/2010-59-			
Loughborough **Prof Richard Hague**	Unlocking the Design Potential of Rapid Manufacturing	http://www.google.nl/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=0CFMQFjAD&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.118.1496%26rep%3Drep1%26type%3Dpdf&ei=lgMaUeONHqKX1AXwv4CYAQ&usg=AFQjCNEiQj0cHjJjUr9wpSVMNJyFRAjKeA&bvm=bv.42261806,d.d2k			
Jannis Breuninger, Fraunhofer IPA, Germany	Correct constructional design – methods and rules	DDMC 2012, Direct Digital Manufacturing Conference, CD-ROM Berlin, Germany, March 14-15, 2012		design rules / Methodes	
Breuninger, J., Becker, R., Wolf, A., Rommel, S., Verl, A	Konzeption und Konstruktion für Selektives Lasersintern	http://www.springer.com/engineering/production+engineering/book/978-3-642-24324-0			

- *Deviations from Annex I: Originally planned for M6, however postponed to M12 to enable more input to be incorporated in the overviews.*
- *No deviations from the planned use of resources.*
- *No corrective actions proposed*

D3.2 (three) 3 Working Group meetings held per WG

In order to collect and process and discuss all material gathered by all stakeholders, each of the Working Groups had 3 meetings to elaboration new work items, prepare content and achieve consensus.

Significant results

		1st WG1 meeting: Paris, December 7th 2012	2nd WG1 meeting: Zurich, March 3th 2013	3rd WG1 meeting: Brussels, September 26th	1st WG2 meeting : Leuven – 12/06/13	2nd WG2 meeting: Telecon – 06/09/13	3rd WG2 meeting Brussel – 26/09/13	4th WG2 meeting: Eindhoven – 06/11/2013	1st WG3 meeting : Leuven – 12/06/13	2nd WG3 meeting: Telecon – 06/09/13	3rd WG3 meeting: Brussel – 26/09/13	4th WG3 meeting: Eindhoven – 06/11/2013
		WG1			WG2				WG3			
Henk Buining	TNO	+	+	+		+	+	+		+	+	+
Adriaan Spierings	Inspire	+	+	+			+	+			+	+
Charlotte Jansen	Printed Jewellery	+	+	+			+	+			+	+
Martin Schäfer	Siemens		+	+			+	+			+	+
Benoit Verquin	CETIM		+	+	+	+	+	+	+	+	+	+
Catherine Lubineau	UNM		(T)	+			+				+	
Dominique Theeuwen	Layerwise			+	+	+	+	+	+	+	+	+
Philippe Betrandt	ViaMéca			+	+	+	+	+	+	+	+	+
Igor Movchan	Enise			+	+		+	+	+		+	+
Suny Martinez	AIJU			+			+				+	
Pepi Galvani	AIJU							+			+	+
Ross Friel	Loughborough University			+			+				+	
Klas Boivie	SINTEF			+			+	+			+	+
Frits Feenstra	TNO			+	+	+	+	+	+	+	+	+
Carsten Engel	Sirris			+	+		+		+		+	
Eric Baustert	MBB							+				+
Mario Domingo Monzon	U Las Palmas de Gran Canaria					+	+	+		+	+	+
Hans Weber	NEN						+	+			+	+
Tom Craeghs	Materialise				+				+			

The Work Group meetings as specified in deliverable 3.2 where carried out successfully and contributed to the results in which overviews of stake holders and technical documents were produced.

• *Deviations from Annex I: the last meetings were held in M15 instead of M12 due to planning purposes (a.o. coincidence with AM-Platform meetings, more meetings held than planned*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed.*

D3.3 First and second draft of a European Standard for each of the areas of the Working Groups
Note: The title was changed to D3.3 Guidelines for the development of the EU standards in Additive Manufacturing. This was changed since less optimal coverage of content**.**

Some significant results:

According to the Work plan SASAM consortium has formed 3 Work Groups (WG) and assigned them the following topics:
WG 1 – Design in Additive Manufacturing (methodology, algorithms and data formats);
WG 2 – Materials / Processes (primary materials characterization, processing parameters setting-up and control, post –treatment auxiliary processes);
WG3 – Test Methods / Products Characterisation (test methods, physical and mechanical characteristics of final products).

Part I of the document describes the work performed within WP3 by three above mentioned WGs and SASAM consortium in a whole.
Part II of the document presents WP3 results that have the character of guidelines for the development of the future EU / World standards in Additive Manufacturing concerning several priority subjects and provides the support for the subsequent detailed elaboration of standards structure and content.

WG1 “Design in Additive Manufacturing”

Design in AM guidelines present the general methodology and describe the procedures applied in course of the conception and engineering of the product. Design guidelines give an indication about what decisions and in what sequence the different design steps could/have to be taken.
The present document sets-up the basis for the standard design methodology specific to Additive Manufacturing. In general, it shall be supported by a set of Technical Specification documents, where process details such as

- Process-specific design,
- Design opportunities and restrictions,
- Materials and material properties

are described.
From the technical point of view, the subsequent development / elaboration of “Design in Additive Manufacturing” documents shall also treat some strategic for AM aspects such as

- Topology optimisation,
- Lattice structures fabrication,
- Multi-material manufacturing.

WG2 “Materials / Processes” in Additive Manufacturing

The scope defined initially for WG2 was: Materials and process technical report shall identify and recommend the necessary topics for 1) processing requirements, 2) process & material security and 3) material specifications for AM standards covering materials and process.
First of all, a discussion within SASAM consortium and numerous communications with other interested parties were engaged to identify the most relevant items for normalisation. In course of these communications Work Group 2 and Work Group 3 “Test Methods / Products characterisation” have worked out and applied in their activities similar methodology that can be presented as follows:

- Identification of the most relevant items and information sources

- Classification and ranking of the identified items

SASAM has worked out its proper approach to develop the Norms / Standards relative to AM. WG2 "Materials / Process" and Work Group 3 "Test Methods / Products characterisation" applied in their activities similar methodology that can be presented as follows.

- To formulate the scope of the standard relative to AM
  - primary materials characteristics and properties,
  - processing techniques and parameters,
  - post-treatment techniques and parameters,
  - final product test methods and characteristics);
- To present the actual state-of-the–art in normalisation: the existing ISO, ASTM and other norms related to the corresponding bulk material, conventional subtractive manufacturing techniques, tests methods, etc.;
- To present the structure of the existing norms and standards, i.e. what items are treated by them and how (not only physical/mechanical properties of a certain material, but also the information that shall be presented in the Specification Sheet, the characteristics that can be provided by the supplier, or the characteristics that can be obtained by the customer, best practice of materials processing, etc.);
- To identify the specific features and specific items that shall be treated by the Norms / Standards relatively to Additive Manufacturing;
- To indicate how the existing the Norm / Standard shall be elaborated to cover the specific features of Additive Manufacturing;
- To provide scientific and technical basis for future Norms / Standards in the form of scientific , web-resources).

PART II of the deliverable describes the detailed description of SASAM WP3 results. The following items are described (more details in the deliverable D3.3. itself, numbers refer to chapter numbers):

6. WG1 "DESIGN"
7. WG2 "Materials / Process"
7.1. Normalisation guidelines for Titanium Grade1
7.2. Normalisation guidelines for TiAl6Nb7
7.3. Normalisation guidelines for Nickel-base alloys
7.4. Normalisation guidelines for standard polyamides
7.5. Normalisation guidelines for flame retardant polymers
7.6. Normalisation guidelines for Process Monitoring
8. WG3 "Tests methods / Products Characterisation"
8.1. General outlook at the standardisation state-of-the-art
8.2. Normalisation guidelines for Tensile Strength
8.3. Normalisation guidelines for Flexural Strength
8.4. Normalisation guidelines for Fatigue Resistance
8.5. Normalisation guidelines for Geometric Tolerance
8.6. Normalisation guidelines for Geometric Requirements: technical drawings in AM

An extensive excel sheet with all relevant links and sources has been produced and can be found at the partners area of the SASAM website.

MS3 First draft of a European Standard for each of the areas of the Working Groups

This milestone is identical to the achievement of D3.3. Details of the milestone are given (D3.3) above.

• *Deviations from Annex I:*

- *the original Milestone 3 was planned for M12, however postponed to M16 to incorporate more results.*
- *a new title was proposed, which better fitted the content.*

• *No deviations from the planned use of resources.*

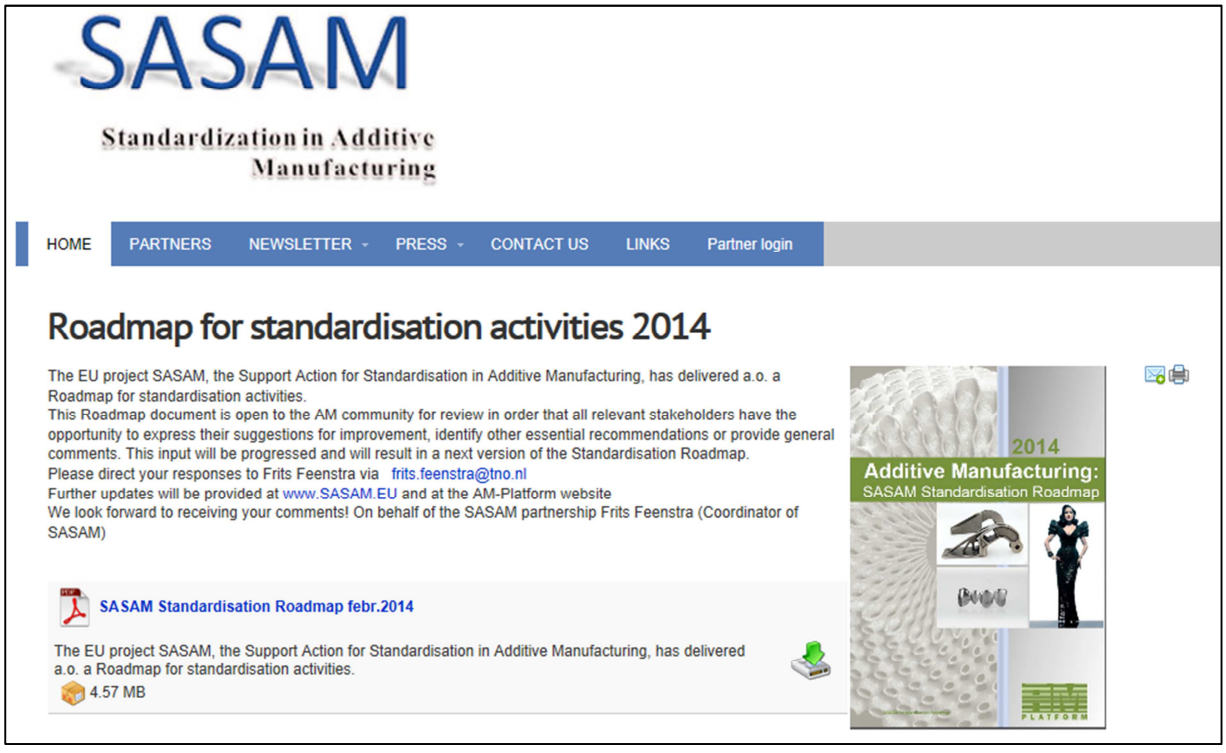
• *No corrective actions proposed.*

WP4 Dissemination

The overall objectives of this work package are to create and extend an awareness of and an interest for Standardisation for Additive Manufacturing as well as to bring partners from the whole value chain together in order to initiate and establish appropriate and necessary contacts for further interaction. Therefore, it is necessary to create a platform to raise interest in an industrial standard for Additive Manufacturing outside the already established community. Project objectives for the period were:
O4.1 Setting up a website for SASAM
O4.2 Workshops + Conferences in combination with CEN (STAIR initiative)

Significant results

D4.1 SASAM website established: www.SASAM.eu
SASAM website was established: www.SASAM.eu.
There is already today a large number of websites available, addressing manufacturing technologies. However, a project website serves multiple purposes, including in-project communication as explained in WP5, Project Management, so it is definitely needed.
By creating the SASAM platform we share the information between the participants and have an official website reachable to anyone interested in the technology. The website was created with a public part where common information such as seminars and technology advances is accessible to any public body. The second part is a secure area in which SASAM participants can exchange information. The website has links to important manufacturing related websites, as for example the Additive Manufacturing website.



- *No deviations from Annex I*
- *No deviations from the planned use of resources.*
- *No corrective actions proposed.*

D4.2 workshop organized together with the AM-Platform

To facilitate transfer from research to innovation, additionally to standardization requirements, there is a compulsory need to boost the industry leaders to guide the industrial implementation of the scope of the action by their initiatives. Thus, it was from the start one of the SASAM's main focus to carry out a dedicated workshop organized jointly with the AM- Platform, which was held on November,7th 2013 and attended by 44 experts (8 of them were SASAM partner). The objective was to conciliate and share the different interests and visions from the Commission, the funding program H2020 (and previous and foreseen actions), the SASAM Roadmap, the AM-Platform SRA and the all the stakeholders' of current and future requirements on Standardization in Additive Manufacturing (AM).

Subscriptions AM-Plaform -SASAM meeting @ TNO Eindhoven			
7-11-2013			
1	Adriaan Spierings	Inspire	CH
2	Marco Cavallaro	Synesis + Footwear ETP	It
3	Sozon Tsopanos	TWI	UK
4	Oscar Brocades Zaalberg	BPO	NL
5	Axel Demmer	FhG IPT	DE
6	Kelvin Hamilton	Delcam	UK
7	Johnny van der Zwaag	Delcam	UK
8	Carsten Engel	Sirris	BE
9	Peter Woolliams	NPL	UK
10	Rob Scudamore	TWI + Joining ETP	UK
11	Onno Ponfoort	Berenschot	NL
12	Salomé Galjaard	Arup	NL
13	German Esteban Muniz	European Commission	BE
14	Krista Polle	Microcentrum	NL
15	Bo-Göran Andersson	Hoganas	SE
16	Magí Galindo	Leitat	ES
17	Albert Torres	Leitat	ES
18	Ding Jin	Philips	NL
19	Kunigunde Cherenack	Philips	NL
20	Christoph Klahn	Inspire	CH
21	Eric Klemp	DMRC Paderborn	DE
22	Sasan Dadbakhsh	KU Leuven	BE
23	STAVROPOULOS Panagiot	LMS	GR
24	Pepi Galvani	AIJU	ES
25	Pasi Puukko	VTT	FI
26	Dieter Schwarze	SLM Solutions	DE
27	Mrs Schwarze	SLM Solutions	DE
28	Filip Motmans	VITO	BE
29	Martin Schaefer	Siemens	DE
30	Rene Groothedde	RM Center NL	NL
31	Frits Feenstra	TNO	NL
32	Ruben Rijpkema	KLM	NL
33	René Scholten	KLM	NL
34	Henk Buining	TNO	NL
35	Gerrit Oosterhuis	VDL ETG	NL
36	Frans Willem Goudsmit	VDL ETG	NL
37	Eric Baustert	MB Proto	FR
38	Niek Dijkshoorn	TNO	NL
39	Bart van de Vorst	TNO	NL
40	Frits Verhoeven	TNO	NL
41	Gregor van Baars	TNO	NL
42	Prof Kruth	KU Leuven	BE
43	Arno Gramsma	KMWE	NL
44	Paula Queipo Rodríguez	Prodintec	ES

• Deviations from Annex I: the original deliverable was planned for M10, however postponed to M17 for planning purposes

• No deviations from the planned use of resources.

• No corrective actions proposed.

D4.3 workshop organized together with the CEN

The liaison with other norming institutes and initiatives is a key element of SASAM and was effectuated by organising an open meeting together with CEN-CENELEC on September 27th 2013 where 29 experts were attending.

The objective was to have a platform to acquire and secure input from relevant stakeholders (international as well as from several EU projects), to present some first deliverables from SASAM as well as to look forward to the future of standardisation after SASAM is finished.

In conjunction with this, and as part of the presentations, the AM-platform recently drafted the SRA 2013 (strategic research agenda) which indicated that standardisation is considered a key element for industrial implementation of AM technology. Also the EC-JRC (Joint Research Center) presented their views on how standards are positioned within the International Landscape Vision (ILV) 2025.

A discussion on how the coordination of standardisation should be continued after SASAM had started, however did not provide a clear conclusion yet.

Presentations are available through the link:

http://www.cencenelec.eu/research/SuccessStories/AdditiveManufacturing/Pages/default.aspx

The participation and contributions from SASAM partners in this group ensured that the European voice is heard and implemented in the document.

- *Deviations: the original deliverable was planned for M16, however executed earlier to M13 for planning purposes*
- *No deviations from the planned use of resources.*
- *No corrective actions proposed*

MS4 workshop organized together with the CEN

This milestone is identical to the achievement of D4.3. Details of the milestone are given (D4.3) above.

- *Deviations: the original deliverable was planned for M16, however executed earlier to M13 for planning purposes*
- *No deviations from the planned use of resources.*
- *No corrective actions proposed*

Other dissemination & SASAM in press / journals

Action	no.	Results - *remarks*
Partners' Newsletter	8	*1 online information Platform*
Partners' Websites	18	
Presentations	15	
Events	4	*AM Platform (2) CENELEC (29 assistants) & STAIR AM*
Webinars	1	80 attendants - *220 unique visitors to digital content*
Trade Articles in Technical Magazines	5	
Communication Plan	1	
Christmas	2	Distributed to 620 contacts each
Newsletters	4	44 subscribers - *A final one is missing*
Press Releases	5	110 insertions - *Highlight: 2 EFFRA + 2 TCT*
Publishable Roadmap	1	
Social Media	7	
Website Contingency plan	1	
Website Creation (continuous update)	1	Globally: 60 Public Insertions - *1875 Visitors*

Year 2014							
Name of Meeting	**Begins**	**Ends**	**Abstract Due**	**Final Paper Due**	**Location**	**Sponsoring Org**	**Contact**
9th International Conference on Additive Manufacturing & 3D Printing	07-July-14	11-July-14	TBA (very limited acceptance; see the conference web-site.)		Nottingham Belfry Mellor's Way, Off Woodhouse Way Nottingham NG8 6PY UK	Loughborough University, UK and Econolyst Ltd UK	Int'l Conference on Additive Manufacturing The Silversmiths Crown Yard Wirksworth Derby, DE4 4ET UK Tel: +44(0)7817 135902 Email: donna@am-conference.com
RAPID 2014 Conference & Exposition ***Learn More...***	09-June-14	12-June-14	01-Dec-13	21-April-14	Cobo Center, Detroit, MI USA	SME (Society of Manufacturing Engineers)	SME One SME Drive POB 930 Dearborn, MI 48121 1-800-733-3976 FX: 313-425-3407 Event email: Gary Mikola
Additive Manufacturing with Powder Metallurgy" (AMPM)	18-May-14	20-May-14	25-Oct-13		Orlando, Florida , USA	Metal Powder Industries Federation	Metal Powder Industries Fed. 105-T College Rd., E. Princeton, NJ, 08540 TEL: 609-452-7700 Email: jadams@mpif.org
Fraunhofer Direct Digital Manufacturing Conference 2014 (DDMC 2014)	12-March-14	13-March-14			Grand Hotel Esplanade, Berlin, Germany	Fraunhofer Additive Manufacturing Alliance	www.ddmc-fraunhofer.de
RapidPro 2014	26-Feb-14	27-Feb-14			NH Conference Centre Koningshof, Veldhoven, The Netherlands	Mikrocentrum	Els van de Ven Event email: events@mikrocentrum.nl TEL: +31(0) 40 2969922
3D Printshow 2014-New York	13-Feb-14	15-Feb-14			Metropolitan Pavilion New York, NY USA	Team Awesome Events	3d Print Show Ltd Tel: 0843 772 9894 Fax: 0843 772 9892 info@3dprintshow.com

WP5 Project Management

The objective of this work package is to secure that project objectives are reached and all available resources fully utilized in a coordinated and controlled manner, which also ensures that budgets and time schedules for each activity as well as for the entire project are kept.

Task 5.1 Kick Off (TNO)
All participants were invited to a kick-off meeting, in which the management structure is discussed. In particular, the following issues are settled and agreement reached about meeting frequencies, communication links, responsibilities and actual content of the work

Task 5.2: Establishment of guidelines and structure for in-project reporting & Communication (TNO)
The following guidelines were approved at the kick-off meeting in Eindhoven:
- A web portal supporting group work is established. It includes mailing list, calendar and file sharing.
- When sending out information, it is suggested that it is done in Word, not pdf format.
- Each company/institution shall have a main contact and a secondary contact for being sure that answers are given in time. We agreed that answers shall be given within max. one week. Interaction WPs in between: use web, don't send email every week, collect information and send in bigger portions.
- Information sharing: Background is not only "yesterday's" work.
- Be clear on what the different companies will share and won't share in SASAM
- Half year meetings will be hosted by different partners.
- Presentations from these meetings will be shared on the web portal.

Task 5.3: Management of the project (TNO)
Following the completion of sub-tasks 5.1 and 5.2 a management structure was established that will secure that the objectives of this WP can be reached.
Project management and reporting weredescribed in section 2.1 of the DOW. Special attention was paid to the following critical issues:
− Detailed planning of Work Packages and sub-tasks.
− Coordination of activities between participants. It is the responsibility of the project management to secure that activities are coordinated in a way that secures that resources are applied as effectively as possible independently of which participant is main responsible. I.e task could be shifted to other participants, if it is obvious that this furthers a better utilization of the total sum of resources.
− Monitoring of all tasks. Check that deliverables are submitted in time.
− Deliverable: When a deliverable is due, the project management will check that it is reached as far as timing, consumption of resources and related objectives. If corrective action is needed, the responsibility rests with the Chairperson of the Steering Committee.
Periodic reports to monitor the progress of the project will be made to the Commission

D5.1 Guidelines for reporting
D5.1 presents guidelines for reporting for the different activities made during the project. It was discussed during the general assembly and not revised during the project period. Guidelines were given for a Technical Report and template for the dissemination activities (presentation). For the management reports such as financial reporting and scientific reporting, the documents on the Participants portal under Grant Management, Financial Reporting and Scientific Reporting were used.

• *No deviations from Annex I*

• *No deviations from the planned use of resources.*

• *No corrective actions proposed.*

D5.2 Reports to the European Commission
Periodic Report at project end: M18 i.e. this report
Financial report: forms C and use of project effort per partner is already uploaded on SESAM; an overview of both documents is provided below.

• *No problems have occurred;*
• *No changes in the consortium;*

FP7 - Grant Agreement - Annex VI - Coordination and support action

Summary Financial Report - Coordination and support action

Project acronym	SASAM	Project nr.	319167	Reporting period from	01/09/2012	to	28/02/2014	Page	1/1

Funding scheme: CSA

Beneficiary nr.	If 3rd Party, linked to beneficiary	Adjustment (Yes/No)	Organization Short Name	Type of activity										Total (A)+(B)+(C)+(D)+(E)		Receipts	Interest
				RTD (A)		Demonstration (B)		Coordination / Support (C)		Management (D)		Other (E)					
				Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution	Total	Max EU Contribution		
1		No	INO	0.00	0.00	0.00	0.00	77,276.97	38,302.47	50,580.54	21,015.07	18,835.86	8,080.34	146,693.37	67,397.88	0.00	0.00
2		No	Siemens	0.00	0.00	0.00	0.00	78,816.50	37,382.25	12,339.84	5,811.85	12,516.66	6,564.24	103,673.00	49,758.34	0.00	0.00
3		No	Simef	0.00	0.00	0.00	0.00	68,092.38	33,200.71	5,102.71	3,688.86	13,676.25	6,979.77	76,871.34	43,869.34	0.00	0.00
4		No	AITU	0.00	0.00	0.00	0.00	36,562.20	32,601.30	3,173.76	2,829.94	25,918.97	23,111.08	65,654.93	58,542.32	0.00	0.00
5		No	PrintedJewelry	0.00	0.00	0.00	0.00	18,144.00	16,178.40	1,536.00	1,369.60	4,860.00	4,333.50	24,540.00	21,881.50	0.00	0.00
6		No	Vilamoca	0.00	0.00	0.00	0.00	29,293.40	26,119.95	0.00	0.00	0.00	0.00	29,293.40	26,119.95	0.00	0.00
7		No	MBProto	0.00	0.00	0.00	0.00	26,525.75	23,652.13	1,228.80	1,095.68	0.00	0.00	27,754.55	24,747.81	0.00	0.00
8		No	Sirris	0.00	0.00	0.00	0.00	28,552.37	19,064.40	4,025.44	2,692.01	3,702.76	2,476.23	36,280.57	24,232.64	0.00	0.00
9		No	Materialise	0.00	0.00	0.00	0.00	26,208.87	10,336.38	0.00	0.00	0.00	0.00	26,208.87	10,336.38	0.00	0.00
10		No	Layerwise	0.00	0.00	0.00	0.00	21,756.00	19,389.10	1,200.00	1,070.00	4,896.00	4,365.60	27,852.00	24,824.70	0.00	0.00
11		No	Ins	0.00	0.00	0.00	0.00	30,262.81	26,984.18	4,840.26	4,315.90	1,653.29	1,474.18	36,756.16	32,774.24	0.00	0.00
11		Yes	Ins	0.00	0.00	0.00	0.00	37,504.78	33,441.75	4,840.26	4,315.90	1,914.06	1,706.70	44,259.08	39,464.35	0.00	0.00
12		No	ULeighborough	0.00	0.00	0.00	0.00	24,198.31	21,575.04	0.00	0.00	2,122.72	1,892.76	26,319.03	23,467.80	0.00	0.00
13		No	Cetim	0.00	0.00	0.00	0.00	35,078.09	22,773.23	2,106.94	1,252.46	6,320.81	3,757.37	43,505.84	27,783.06	0.00	0.00
14		No	Eni	0.00	0.00	0.00	0.00	25,199.99	22,469.99	0.00	0.00	4,516.39	4,027.12	29,716.38	26,497.11	0.00	0.00
15		No	ULPGC	0.00	0.00	0.00	0.00	18,644.03	16,624.26	3,009.90	2,683.83	10,846.02	9,492.70	32,299.95	28,800.79	0.00	0.00
16		No	NEN	0.00	0.00	0.00	0.00	14,341.00	9,349.66	1,127.00	661.26	1,127.00	661.26	16,595.00	10,672.18	0.00	0.00
17		No	UNM	0.00	0.00	0.00	0.00	12,653.68	11,550.36	2,539.68	2,264.55	1,170.00	1,043.25	16,863.36	14,858.16	0.00	0.00
18		No	SIS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL				0.00	0.00	0.00	0.00	599,408.91	421,035.54	97,851.13	55,066.91	113,878.79	79,066.10	810,938.83	558,068.55	0.00	0.00

Requested EU contribution for the reporting period (in €): 558,068.55

List of project meetings & venues:

		Kick-off, September 17-18 2012, Eindhoven	Second GA meeting December 5-6th 2012 Paris	Third GA meeting March 6-7th 2013 Brussels	Forth GA meeting Sept 26th 2013 CEN Brussels	SASAM-STAIR AM meeting sept 27th 2013 CEN Brussels	Final Meeting February 20th 2014 TNO Eindhoven
Suny Martinez	AIJU		+	+	+	+	
Cesar Carrion	AIJU	+					
Pepi Galvani	AIJU						
Pat Picariello	ASTM			+*)		+*)	
Sara Gobbi	ASTM			+*)		+*)	
Scott Johnson	Boeing			+*)			
Luc van den Berghe	CENCENELEC	+		+		+	
Benoit Verquin	CETIM	+	+	+	+	+	+
Igor Movchan	Enise	+	+	+	+	+	+
Joerg Lenz	EOS			+*)		+*)	
German Esteban	EC			+		+	
Neophytos Neophytou	EC			+			
Adriaan Spierings	Inspire	+	+	+	+		
Manfred Schmidt	Inspire	+					+
Dominique Theeuwen	Layerwise				+		+
Brawley Valkenborgs	Layerwise	+	+				
Ross Friel	LBORO				+	+	
Robert Kay	LBORO	+					
Russ Harris	LBORO	+		+			
Tom Craeghs	Materialise						+
Eric Baustert	MBB	+	+	+			+
Hans Weber	NEN	+	+	+		+	+
Charlotte Jansen	PrintedJewellery	+		+	+	+	+
Martin Schäfer	Siemens	+	+	+	+	+	+
Klas Boivie	SINTEF	+	+	+		+	+
Carsten Engel	Sirris				+	+	
Thierry Dormal	Sirris	+	+		+		
Johan Wahren	SIS						
Henk Buining	TNO	+	+	+	+	+	+
Frits Feenstra	TNO	+	+		+	+	+
Jan Buijs	TNO	+					
Mario Domingo Monzon	ULPGC	+	+	+			+
Catherine Lubineau	UNM	+	+	+	+	+	
Philippe Betrandt	ViaMéca	+	+	+	+	+	+
Brent Stucker	VTT/U Louisville			+*)			
Bogdan Dybala	Wroclaw Univ.					+*)	
Amanda Allison	TWI					+*)	
Sozon Tsopanos	TWI					+*)	
Juan Izaza	FhG-IFAM					+*)	
Sarfraz Minhas	BTU Cottbus					+*)	
Amir Sabirovic	Berenschot					+*)	
Onno Ponfoort	Berenschot					+*)	
Filip Motmans	VITO					+*)	

*) only attending the non-confidential part of the meeting

Project planning and status
The project had a slow start with some delay in performance however has ended well on track. The consortium has been working on the different deliverables without exception.
The economic status of the project is also on track, as the consortium used capacities conform originally expected. Some of them even spent more effort than planned.

Partner SIS decided that they would not charge their costs to the EU. They found alternative funding and returned the pre-payment to the Coordinator. Depending on the performance, some other over performing partners might be reimbursed little bit more than originally planned.

The table of use of project effort is provided below and also uploaded on SESAM.

USE OF PROJECT EFFORT

PERIOD: 01/09/2012 - 28/02/2014

Work Package	Title		TOTAL	Project Effort per Beneficiary and Work Package																	
				1. TNO	2. Siemens	3. Sintef	4. AIJU	5. Printed Jewelry	6. Vlameca	7. MBProto	8. Sirris	9. Materialise	10. Layerwise	11. Inspire	12. Loughborough University	13. Celim	14. Enise	15. ULPGC	16. NEN	17. UNM	18. SIS
WP1	Stakeholders / Scoping of requirements	*Actual for the period*	*7,92*	*1,50*	*1,16*	*0,45*	*1,86*	*0,40*	*0,20*	*0,20*	*0,23*	*0,12*	*0,20*	*0,49*	*0,33*	*0,25*	*0,18*	*0,35*	*0,00*	*0,00*	*0,00*
		Planned for the whole project	*5,70*	*0,60*	*1,20*	*0,80*	*0,80*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,30*	*0,00*	*0,00*	*0,00*
		%use of planned efforts	*139%*	*250%*	*97%*	*56%*	*233%*	*200%*	*100%*	*100%*	*115%*	*60%*	*100%*	*245%*	*165%*	*125%*	*90%*	*117%*	*0%*	*0%*	*0%*
WP2	Roadmap for AM standardisation	*Actual for the period*	*15,96*	*1,10*	*1,70*	*1,90*	*4,22*	*0,45*	*0,59*	*0,62*	*0,61*	*0,29*	*0,60*	*0,69*	*0,42*	*0,74*	*0,50*	*1,28*	*0,15*	*0,10*	*0,00*
		Planned for the whole project	*12,20*	*1,10*	*1,80*	*2,00*	*0,80*	*0,60*	*0,60*	*0,60*	*0,60*	*0,60*	*0,60*	*0,30*	*0,30*	*0,60*	*0,60*	*0,80*	*0,10*	*0,10*	*0,10*
		%use of planned efforts	*131%*	*100%*	*94%*	*95%*	*528%*	*75%*	*98%*	*103%*	*102%*	*48%*	*100%*	*230%*	*140%*	*123%*	*83%*	*160%*	*150%*	*100%*	*0%*
WP3	Standardisation / Norming / Elaboration of work items innovation networks	*Actual for the period*	*33,21*	*2,60*	*1,23*	*0,30*	*1,68*	*1,89*	*2,19*	*2,20*	*1,76*	*2,17*	*2,20*	*2,87*	*2,90*	*2,60*	*2,20*	*2,37*	*1,15*	*0,90*	*0,00*
		Planned for the whole project	*31,70*	*2,50*	*1,20*	*1,00*	*1,00*	*2,60*	*2,10*	*2,20*	*1,90*	*2,10*	*2,20*	*2,30*	*2,30*	*2,10*	*2,00*	*1,20*	*1,00*	*1,00*	*1,00*
		%use of planned efforts	*105%*	*104%*	*103%*	*30%*	*168%*	*73%*	*104%*	*100%*	*93%*	*103%*	*100%*	*125%*	*126%*	*124%*	*110%*	*198%*	*115%*	*90%*	*0%*
WP4	Dissemination	*Actual for the period*	*15,63*	*1,10*	*0,64*	*0,80*	*5,87*	*0,66*	*0,60*	*0,55*	*0,27*	*0,00*	*0,60*	*0,23*	*0,38*	*0,73*	*0,60*	*2,40*	*0,10*	*0,10*	*0,00*
		Planned for the whole project	*11,80*	*1,00*	*0,60*	*0,80*	*2,00*	*0,60*	*0,60*	*0,60*	*0,30*	*0,60*	*0,60*	*0,30*	*0,30*	*0,60*	*0,60*	*2,00*	*0,10*	*0,10*	*0,10*
		%use of planned efforts	*132%*	*110%*	*107%*	*100%*	*294%*	*110%*	*100%*	*92%*	*90%*	*0%*	*100%*	*77%*	*127%*	*122%*	*100%*	*120%*	*100%*	*100%*	*0%*
WP5	Management	*Actual for the period*	*7,71*	*2,90*	*0,59*	*0,60*	*0,48*	*0,23*	*0,20*	*0,18*	*0,21*	*0,00*	*0,20*	*0,47*	*0,20*	*0,24*	*0,20*	*0,71*	*0,10*	*0,20*	*0,00*
		Planned for the whole project	*7,60*	*3,00*	*0,50*	*0,60*	*0,60*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,20*	*0,60*	*0,10*	*0,10*	*0,10*
		%use of planned efforts	*101%*	*97%*	*118%*	*100%*	*80%*	*115%*	*100%*	*90%*	*105%*	*0%*	*100%*	*235%*	*100%*	*120%*	*100%*	*118%*	*100%*	*200%*	*0%*
TOTAL		*Actual for the period*	*80,43*	*9,20*	*5,32*	*4,05*	*14,11*	*3,63*	*3,78*	*3,75*	*3,08*	*2,58*	*3,80*	*4,75*	*4,23*	*4,56*	*3,68*	*7,11*	*1,50*	*1,30*	*0,00*
		Planned for the whole project	*69,00*	*8,20*	*5,30*	*5,20*	*5,20*	*4,20*	*3,70*	*3,80*	*3,20*	*3,70*	*3,80*	*3,30*	*3,30*	*3,70*	*3,60*	*4,90*	*1,30*	*1,30*	*1,30*
		%use of planned efforts	*117%*	*112%*	*100%*	*78%*	*271%*	*86%*	*102%*	*99%*	*96%*	*70%*	*100%*	*144%*	*128%*	*123%*	*102%*	*145%*	*115%*	*100%*	*0%*

Please explain the deviations from the planned work programme:
Manmonth of Sintef is lower than planned: their contribution was conducted very efficient. However more budget spent to travelling than planned (coming from Trondheim).
Manmonth of AIJU, Inspire and ULPGC was higher than planned: all contributed more to the project than originally planned, which was very much appreciated.
SIS decided that they would reimburse all costs involved for SASAM themselves., so no support from the Commission. Prepayment has been returned to TNO.

• There are no deviations with impact from the planned milestones and deliverables

• There are no changes to the legal status of any of the beneficiaries,

• The website was development and described in chapter of Workpackage 4 (above)

Co-ordination activities during the project period have been established with:

- **AM-Platform (www.AM-platform.com)** workshop organized jointly with the AM- Platform, which was held on November,7th 2013, contact **Frits Feenstra (**frits.feenstra@tno.nl)

- **CEN (www.cencenelec.eu)** an open meeting together with CEN-CENELEC on September 27th 2013, Contact **Luc van den Berge** (lvandenberghe@cencenelec.eu)

- **ISO TC 261 (http://www.iso.org)** reporting and information exchange on ISO TC 261 meetings. Contact **Lutz Wrede** (Secretary of ISO TC 261) (lutz.wrede@din.de)

- **ASTM F42 (*www.astm.org*/)** on additive manufacturing. Contact **Pat Piccarillo** (ppicarie@astm.org)

- **JRC (Joint Research Centre) (http://ec.europa.eu/dgs/jrc/) contact Peter Churchill** (peter.churchill@ec.europa.eu)

- **IMS (Intelligent Manufacturing Systems) (http://cordis.europa.eu/ims/home_en.html)** contact **Roberta Salonna** (Roberta.Salonna@ec.europa.eu)