Additive Coordination in East central Sweden (ACES) is a network of organizations collaborating for AM market growth and technology development. By joining forces we can offer a wide portfolio of services and network connections, with the aim of creating joint and mutually beneficial projects.

The initiative comes from the regional governments in East Central Sweden and North Central Sweden who initiated a pre study around AM initiatives in these Swedish regions. The study clearly pointed out the need for a collaborative effort between the publicly funded AM initiatives.

The ACES group consists of 10 partners, from cluster organizations to universities. All open to collaboration, both national and international, in different forms and projects.

We offer a vast network of industries, researchers and process managers, a number of 3D printers, NDT facilities and other appropriate machines. Within ACES there is also a wide range of competences from material, to design, to print, post processing and testing of printed products.

Within ACES we have experience from nano to big scale printing, material research to CT scanning and from basic research to cluster and test bed development.

The aim of this brochure is to give the reader an overview and to present the ten ACES partners.
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Sandbacka Science Park
Alfred Nobel Science Park is located in Karlskoga and Örebro, Sweden. We are a creative meeting arena for industry, academy and public sector.

RESEARCH & FOCUS AREA
Alfred Nobel Science Park has several years of experience within the AM field. Our focus is on open collaboration within our cluster like network, leading the technology as well as the AM market growth. Alfred Nobel Science Park is the coordinator for the ACES group, the Nordic AM Group and a strong partner within the Vanguard Initiative 3DP.

RESOURCES
Through our industry and academic network, we have access to a wide range of competences and machines. From design to post processing and testing, and within several different AM technologies.

CONTACT
Mikael Melitshenko
Project Developer
+46 (0)70 795 78 84
mikael@alfrednobelsp.se
alfrednobelsp.se
RESEARCH & FOCUS AREA
Innovative Materials Arena (IMA) is an innovation environment that encourages collaboration, research and growth in the wide field of advanced materials. IMA is a global network that facilitates development and partnership by establishing connections between and improving the visibility of both existing and new players. The network includes IMA One, a house for lab operations, collaboration and prototyping. Additive manufacturing and 3D printing is a focus area within IMA network due to the wide range of joined members interested in this subject.

RESOURCES
IMA Share is a digital platform for sharing equipment and knowledge. The platform will open up a wide range of resources from IMA members including others interesting in sharing equipment and knowledge with each other. IMA also have a good industrial network with connections to OEMs such as SAAB, Siemens and Gränges. (share.innovativematerials.se)

CONTACT
Pia Lindström
Dreamteam leader & COO
Innovative Materials Arena, IMA
Linköping, Sweden
+46 (0)72 574 00 33
pia.lindstrom@innovativematerials.se
innovativematerials.se
RESEARCH & FOCUS AREA
MITC is integrated in research and education at Mälardalen University (MDH), specifically the School of Innovation, Design and Engineering, where the competence base and resources are found. The main areas of focus for MITC is smart manufacturing, including digitalisation, advanced robotics, cyber-physical systems and artificial intelligence. MITC also addresses industrialisation and product development for the manufacturing industry. MDH offers new courses focusing on Industry 4.0 where Additive Manufacturing is an important technology. MITC can support with student projects and thesis projects related to the area.

RESOURCES & OFFER
1. Research and education projects: including student and thesis projects, as well as paid for student projects. Professional education for industry.
2. SME development: Coaching, development programmes, seminar series and networks.
3. Applied smart production and product development projects with partner companies and SMEs.

CONTACT
Anna Bird
+46 (0)16 15 51 95
anna.bird@mdh.se
The aim of MITC is to establish the Mälardalen region as a competitive node for industrial development, education and research in direct collaboration with the manufacturing industry. MITC’s member companies, e.g., Volvo CE, Volvo GTO, GKN, Alfa Laval and Hexagon, have around 5500 employees and over the years MITC has worked with over 150 SMEs, representing a large part of the region’s industrial base.
“3D-printing will have a huge impact on the manufacturing industry in the years to come, and a better understanding of the material properties of AM parts is vital to utilize the potential of this fairly new technology.”

Johan Moverare, Linköping University

“Impossible geometries, super light materials, meta-materials, seven details become one, one detail but with moving parts, reduced environmental footprint, sustainable production, better design, flexible production, short lead times. Can you think it - you can print it, yes. But not only that, now you can print the unthinkable!”

Magnus Schenström,
project manager for Digikoord.
“The ACES collaboration enables us to open more doors to, and increase our general monitoring in, the 3D/AM area.”

Pia Lindström, IMA

“ACES creates closer ties between different AM stakeholders in East central Sweden and creates opportunities for joint activities and increased visibility.”

Mikael Jonsson, Uppsala University
RESEARCH & FOCUS AREA
The Division explores the relationships between microstructure and mechanical properties of metals, ceramics, composites and polymers including additive manufacturing materials for engineering applications. Research also includes study of environmental impact and degradation of material properties as well as fatigue and durability of materials under service like conditions.

RESOURCES & OFFER
The Division houses a wide range of specialist research test and characterisation equipment housed in own laboratory. Main expertise is within advanced mechanical testing methods such as fatigue testing, crack propagation testing, thermo-mechanical fatigue testing (TMF), creep and dwell-fatigue testing. The deformation and damage mechanisms that are active during the tests are characterised using high-resolution microscopy techniques.

CONTACT
Professor Johan Moverare
Head of the Division
+46 (0)13 28 11 41
johan.moverare@liu.se
“Intelligent design and production”, as in modern production technology

The manufacturing industry in Sweden risks falling behind when it comes to the use of 3D printing technology compared to similar industrialized countries. The project Digikoord will initiate the use of new technology in the field. The project is aiming at supporting small and mediumsized enterprises in East central Sweden.

THE OFFER FROM DIGIKOORD
Design support and 3D printing of prototype in polymer. For the companies that have a tangible detail deemed appropriate. The company meet Siemens, SIT AB and/or Curt Nicolin Gymnasiet for a mutual exchange of ideas and prototyping in their AM workshops.

Design support and 3D printing of prototype in metal. For the companies that have a tangible detail deemed appropriate. The company meet Siemens, SIT AB for a mutual exchange of ideas and prototyping in their AM workshop.

Workshops/”Sprintevents”/training where your company meets designers and production experts at Siemens for a day or two, including analysis of the details and the ability to manufacture them by AM.

Introduction to AM Network, the European network where Companies make use of each other’s AM resources. Participation in an active, business-oriented network of small, medium-sized and also large companies, interested in AM.

CONTACT
+46 (0)70 580 84 93
magnus.schenstrom@cng.se
Finnvedsvägen 4, 612 30 Finspång
www.cng.se   www.digikoord.se
RESEARCH & FOCUS AREA
At Uppsala University research and development in the field of Additive Manufacturing is conducted both in the faculty of Medicine and Pharmacy and the faculty of Science and Engineering. Within Medicine and Pharmacy, U-print, is specialized in designing and 3D-printing custom-made pieces and functional prototypes for use in research or in healthcare. Within Science and Engineering, at Ångström laboratory, research is performed in materials development, equipment development and more fundamental research important in the field of AM. Applications span from industry to Life Science with bio-, polymer-, ceramic- and metal materials.

RESOURCES & OFFER
The university will launch an international master program in Additive Manufacturing 2020. A Vinnova Competence Center, AddLife is in the up-start phase. The vision of the center is to become a global player in education, research and development of additively manufactured materials and components for life science applications, and thereby provide patients with an enhanced quality of life. Printers both for meal and polymer are available. Some of them specially dedicated for students in a maker space. Complementary equipment for materials testing and surface-and heat treatment is also at disposal and daily used.

CONTACT
Erik Lewin, Manager Additive manufacturing initiative at Ångström laboratory erik.lewin@kemi.uu.se  additivemanufacturing.se
Olle Eriksson, Manager U-print olle.eriksson@mcb.uu.se  mcb.uu.se/u-print

ACES Network
RESEARCH & FOCUS AREA
The research group Mechanics and Materials at Mechanical Engineering is conducting research to understand how different materials is behaving mechanically from a component perspective (3D-perspective, with varying thickness etc.) and to develop methods to use this efficiently in the design process for optimisation of both product properties and manufacturing method. Research topics are e.g. CT-methodology, materials technology, development of computer-aided design, optimisation methodology, metamodel-based optimisation, using non-linear FEM.

RESOURCES & OFFER
Mechanics and Materials houses a range of specialist research test and characterisation equipment in our own laboratory and at partner sites. Main expertise is within materials characterization using computed tomography (CT) and advanced microscopy (SEM), mechanical testing methods as well as design optimisation methods.

CONTACT
Professor Lars Pejryd
+46(0) 19 30 38 61
lars.pejryd@oru.se
FOCUS AREAS
Resource efficiency, global challenges and competence and attractiveness of the industry are important fields for development and innovation, where the steel industry is taking measures to maintain leadership. AM is a very interesting field where also SME’s can find opportunities in the value chain.

RESOURCES
Within the Triple Steelix global network you can find possible partners together with market leaders, SME’s and research providers for business and technology development.

CONTACT
Larz Ignberg
Director
+46 (0)70 568 04 80
Larz.Lgnberg@triplesteelix.se

Triple Steelix is a regional cluster organisation promoting innovation, growth and competence within the steel and metals related industry. We are present at Science Parks in Borlänge, Sandviken and Västerås.
Sandbacka Science Park in Sandviken in collaboration with Region Gävleborg has the role of regional innovation node.

**FOCUS AREAS**
With a focus on industrial IT and gamification, energy efficiency, materials technology and sustainable production, Sandbacka Science Park will strengthen its position in several areas of the regional strategy for smart specialization.

**RESOURCES**
Sandbacka Science Park is a dynamic, expansive hub for future products and services, and stimulates collaboration, knowledge transfer and business exchange between companies. The surrounding community, universities and or other institutes with higher education and research.

**CONTACT**
Sima Valizadeh
sima.valizadeh@sandviken.se
Sandbacka Science Park
Sandvikens kommun
Högbovägen 45, Sandviken