Hello ...

This is an analysis of the Nordic Ecosystem within Additive Manufacturing. With this cross-border mapping, we get a base line for, where the Nordic countries are positioned within Additive Manufacturing. From here, we can foster collaboration between production companies with the purpose of strengthening the Nordic competitiveness and ability to manufacture in a greener way. Enjoy!

This paper is made by

And supported by
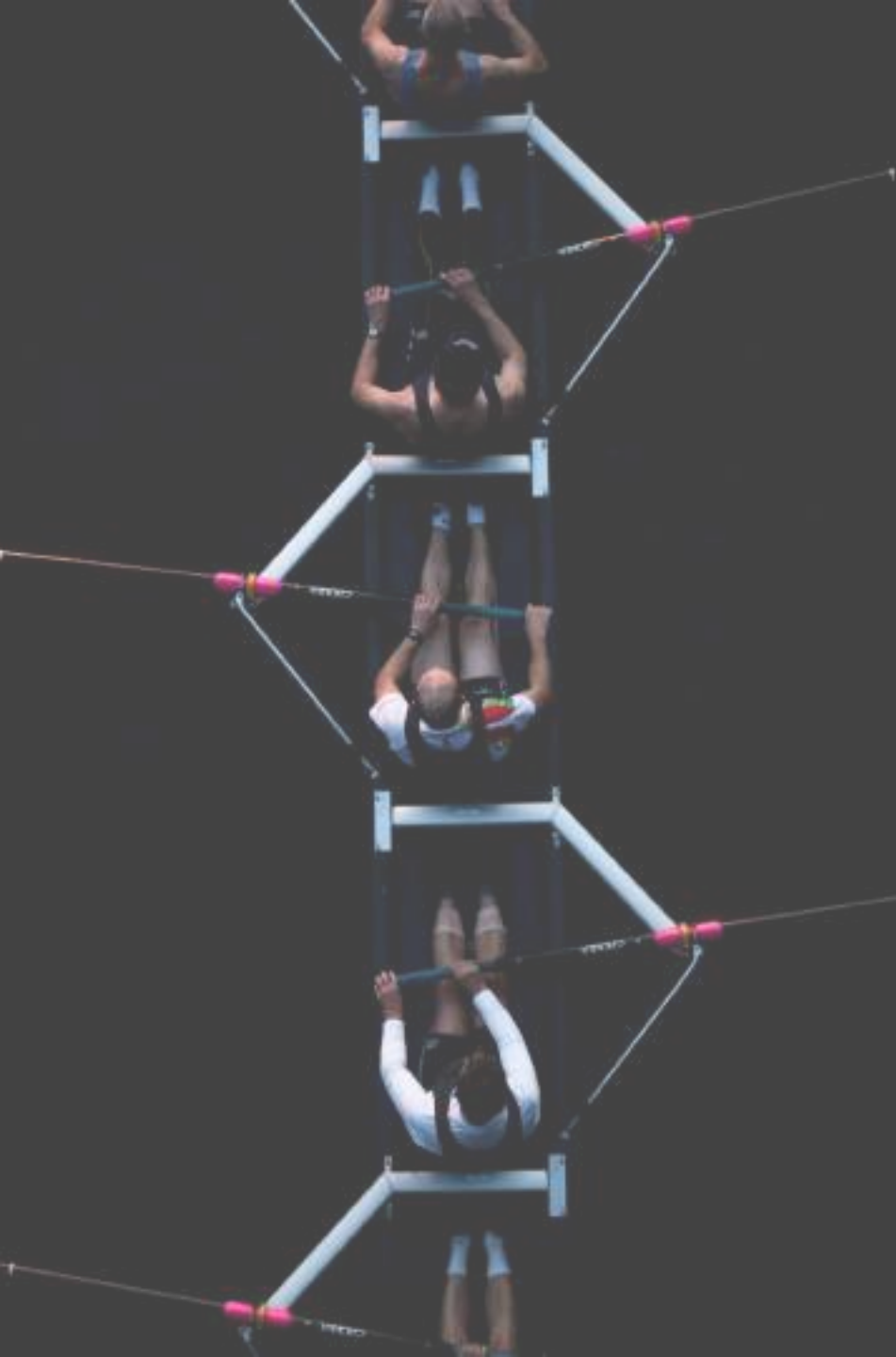
This analysis is a part of the project; AM Nordic – Driving sustainability through Additive Manufacturing in the Nordics. The purpose of the project is to enhance cross-border collaboration in the region, accelerating the green transition and apply knowledge from knowledge partners to the industry.

We are doing this by focusing on sustainability, innovation and the technological development in the growing field of Additive Manufacturing. In the current situation, there is no initiative focusing on how the technology is having a measurable climate effect on production comparable to more classical production methodologies, and who in the region may be able to utilize this. The latter is what this paper is focusing on. We have, thereby, mapped the current AM resources from Denmark, Norway and Sweden. The graphs sum up vital results from our research and describe AM services, material offerings, and motivation for using 3D printing.

What have we done? And how did we do it?

In order to create meaningful insights into the Nordic AM landscape, we have been in dialogue with over 100 companies. We have asked all companies 14 questions including "What is your primary activity?", "What 3D printing services do you offer?", "Which AM technologies do you use?", "Which machinery do have?" and so forth. The analysis was conducted anonymously and by a survey.

The survey has been sent out to over 150 companies. A majority of the companies replied to the survey. However, not all, which means this paper, therefore, is indicative. Nonetheless, we expect the results to be rather trustworthy due to the big sample size.

If you are interested in the full dataset, do not hesitate to reach out to Søren Hansen, Project Manager at Danish AM Hub on skh@am-hub.dk

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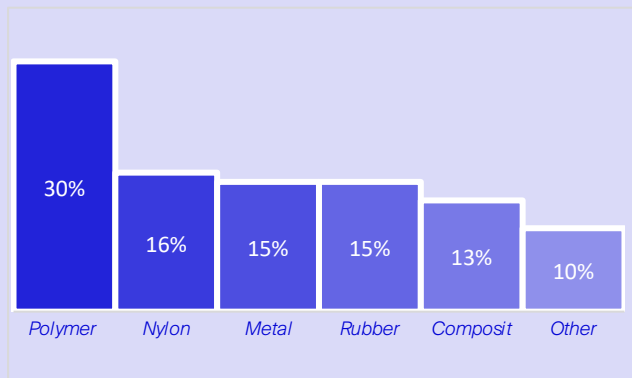*This page shows the results from the Danish AM society.*

In Denmark 36 companies answered the survey out of a total of 50. This gives a response rate on 72 %.

The analysis concludes that the Danish ecosystem is mainly consisting of commercial players. Furthermore, the actors differ in terms of services, materials and core business.
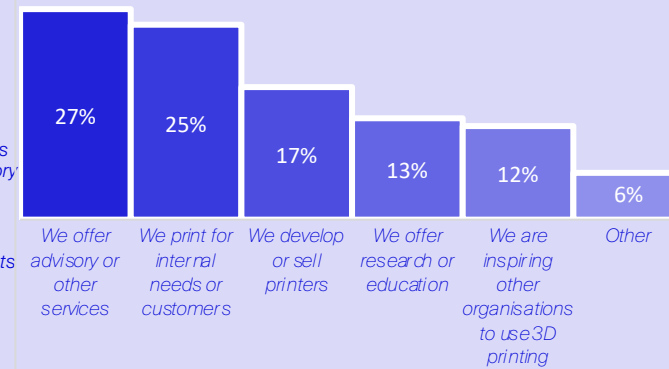
The survey is conducted in conjunction with the industry and executed by Danish AM Hub

Dansk
AM Hub

The graph shows the distribution of the attending companies.
Overall the majority of the companies is service minded, with supporting activities towards other companies. This is services like printing, advisory and support within the AM genre.
A tiny minority is however educating companies, students and other interested in the technology.

We offer advisory or other services	We print for internal needs or customers	We develop or sell printers	We offer research or education	We are inspiring other organisations to use 3D printing	Other
27%	25%	17%	13%	12%	6%

Out of the 36 attending organizations the distribution within commercial and non-commercial is as the following diagram states


- 11% Non-commercial
- 89% Commercial

The most common material organizations use is Polymer.
Polymer printing is the most common material since its availability both technology wise as well as costs
Another material on the rise is metal. The current cost is high but as technology progresses the availability is sure to become the same as polymer


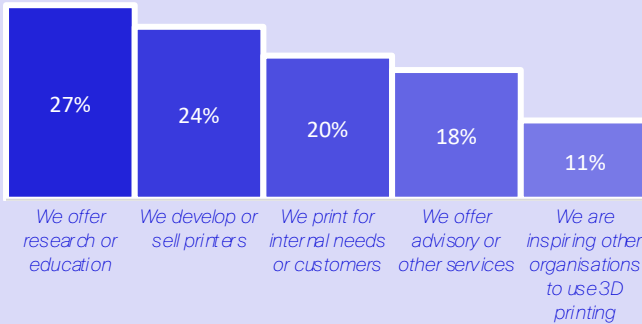| Polymer	Nylon	Metal	Rubber	Composit	Other
30%	16%	15%	15%	13%	10%
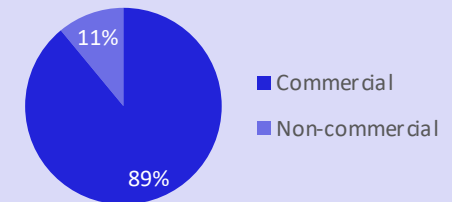
The graph shows in detail what the organizations provided in terms of activities.
The 2 most common services are 3d printing and consulting services / advisory. This was to be expected from the ecosystem since the availability of 3d printers is at is highest. Another post is machines and equipment – 17 organizations in the danish ecosystem distribute printers, material and other AM equipment. This is both B2C and B2B orientated distribution.


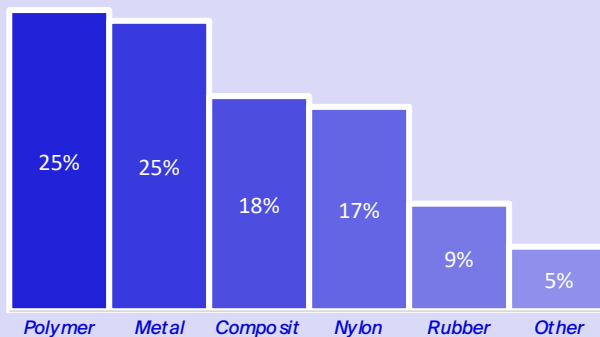| 3D print	Advisory	Machinery	Testing	Materials
67%	53%	47%	42%	39%
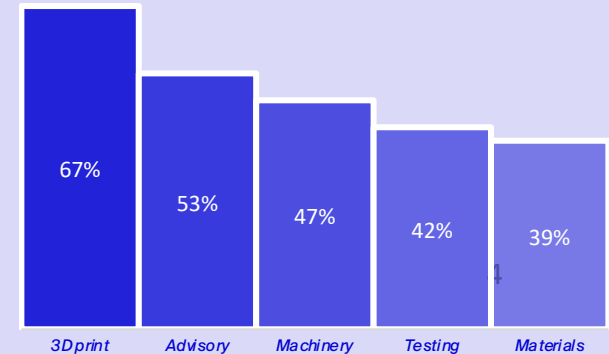
The graph shows the distribution of the attending companies.

The majority of the organizations are either doing research and education or developing and/or selling printers.

27%	24%	20%	18%	11%
We offer research or education	We develop or sell printers	We print for internal needs or customers	We offer advisory or other services	We are inspiring other organisations to use 3D printing

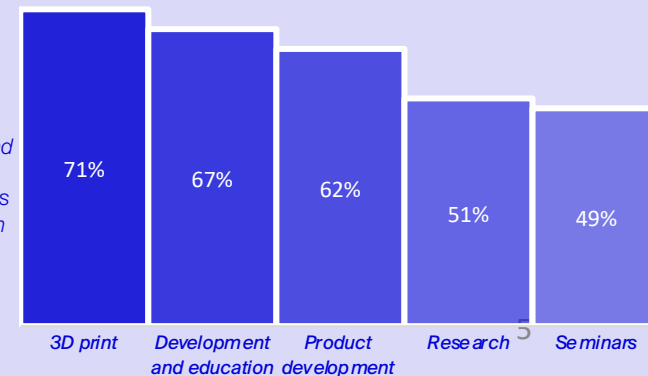*This page shows the results from the Swedish AM industry.*

In Sweden 44 organizations answered the survey out of a total of 57. This gives a response rate of 77 %.

2/3 of the Swedish AM ecosystem consists of commercial players, which is a lower percentage than in Denmark and Norway. This means that there are more Non-commercial organizations in Sweden running different AM initiatives. These are primarily universities with research within the AM field. The majority of the commercial organizations in this survey develop or sell printers, which differs compared to Denmark and Norway.

The survey is conducted in conjunction with the industry and executed by Alfred Nobel Science Park.

Out of the 44 responding organizations the distribution within commercial and non-commercial is as the following diagram states

36% / 64%

■ Commercial
■ Non-commercial

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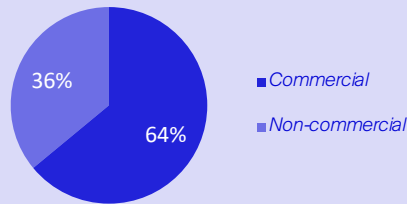
The most common material is Polymer, closely followed by Metal, with several companies and universities investing heavily in the technology.

25%	25%	18%	17%	9%	5%
Polymer	Metal	Composit	Nylon	Rubber	Other

The graph shows what the organizations provided in terms of activities.
The two most common services are 3d printing and Development and education. On third place is Product development, with 28 organizations offering this service.

71%	67%	62%	51%	49%
3D print	Development and education	Product development	Research	Seminars

This page shows the results from the Norwegian AM industry.

In Norway 28 companies participated in the survey.

The attendees in the survey range from big industrial players, universities, research organizations and SMEs. Norway differs from the remaining two Nordic countries by having a relatively high degree of companies printing for internal use or customers (graph in upper right corner) and a high degree of polymer as preferred choice of material.
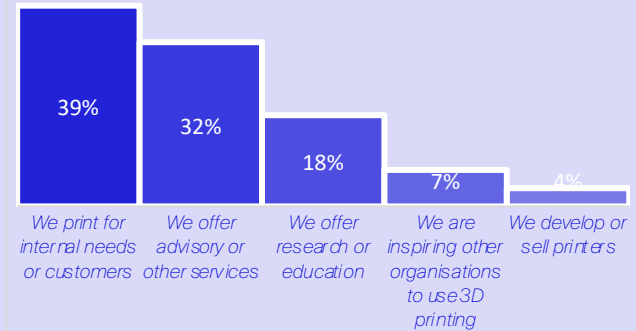
The survey is conducted in conjunction with the industry and executed by Mechatronics Innovation.

Mechatronics Innovation Lab

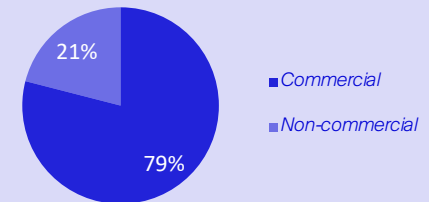*The graph shows the primary activity of the attending companies.*

39 % of the companies are using 3D to either print internal or for customers, while 32 %offer advisory in relation to 3D printing.

Only 4 % develop or sell printers, which is way below the remaining two Nordic countries.

| We print for internal needs or customers	We offer advisory or other services	We offer research or education	We are inspiring other organisations to use 3D printing	We develop or sell printers
39%	32%	18%	7%	4%

The graph shows the distribution of commercial- and non-commercial companies in the Nordics.

Norway has a high degree of commercial companies representing 79 %. Out of 28 companies, 22 of these are commercial.

- Commercial — 79%
- Non-commercial — 21%

The graph shows the distribution of materials used in the 3D printing businesses.

Out of all the Nordic attendees, Norway has the highest degree of polymer (35%) and metal (25 %).

Polymer	Metal	Composit	Rubber	Other
35%	25%	19%	14%	7%
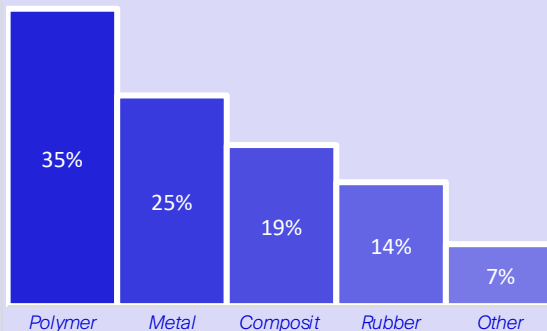
The graph shows the services offered by the companies.

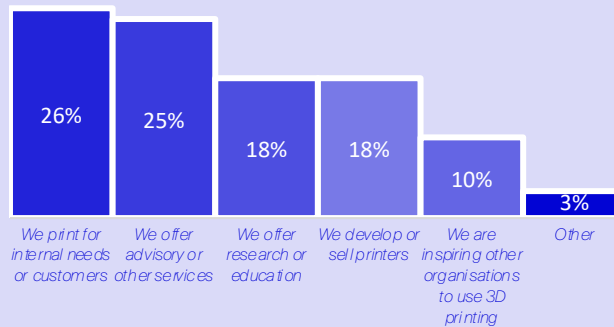*Many of the attendees offer several services, which give a wide range of services.*

In Norway, the most common offered services are 3D printing (64 %), Product Development 64 %), and Advisory and Consulting (61%).

3D print	Product development	Advisory and consulting	Research	Testing and qualification
64%	64%	61%	43%	43%
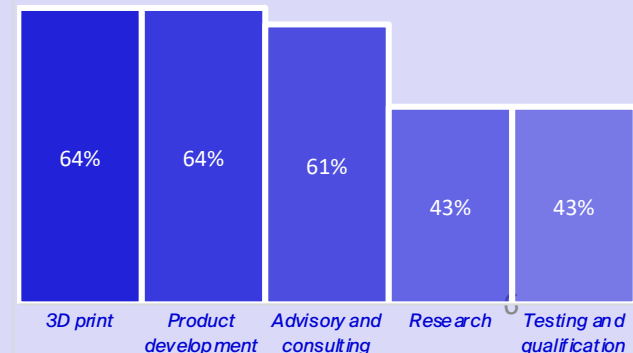
This graph shows the primary activity of the attending companies.

The most common activities is printing for internal use or customer and offering advisory in relation to 3D printing. Combined these activities represent more than half (51%) of the aggregated activities.

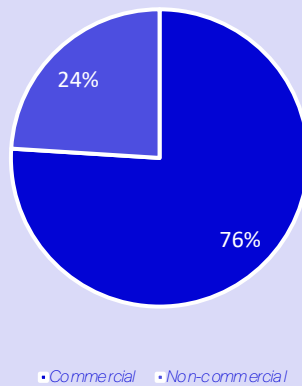| 26%	25%	18%	18%	10%	3%
We print for internal needs or customers	We offer advisory or other services	We offer research or education	We develop or sell printers	We are inspiring other organisations to use 3D printing	Other

This page shows the aggregated results from the Nordics consisting of Denmark, Sweden and Norway

In total, 108 companies attended this survey.

Not all actors using 3D printing is represented in these numbers, as it exceeds 108 many times. Anyway, we believe 108 companies give an insightful indication of the current state of Additive Manufacturing in the Nordics and its application.

The survey is conducted in conjunction with the industry and executed by Danish AM Hub, Alfred Nobel Science Park and Mechatronics Innovation.

The graph shows how 76 % of the attending companies are of commercial character. Out of 109 the attendees, 84 are commercial.
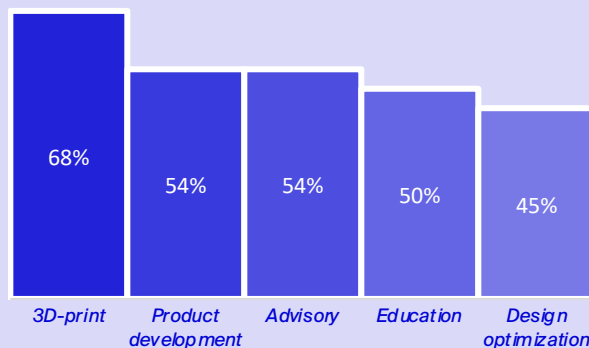
- 24%
- 76%

▪ Commercial ▪ Non-commercial

The graph shows the services offered by the companies.

Many of the attendees offer a range of services.

68 % of the services offered by the companies is 3D printing, 54 % for product development and 54 % for Advisory.

68%	54%	54%	50%	45%
3D-print	Product development	Advisory	Education	Design optimization

This graph shows the choice of material used for 3D printing.

Around one third of these choices is polymer, whereas metal is around one fourth.

34%	25%	18%	15%	9%
Polymer	Metal	Composit	Rubber	Other

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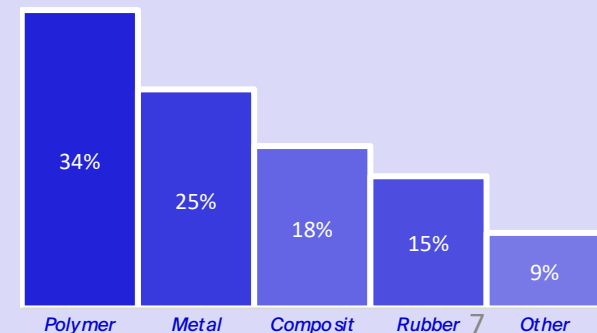
Geographical distribution of Nordic AM Actors

The three maps show the geographical distribution of the participants of the survey. In total 108 different organizations have participated. 36 of them being from Denmark, 44 from Sweden and 28 from Norway.