

Dialogue meeting March 14th

## ***“How should the industry accelerate the application of on-demand production?”***

The meeting was held at Vår Energi (Sandnes) premises march the 14<sup>th</sup>, and had a structure which sought to highlight the benefits and address the current obstacles of implementing on-demand manufacturing within the industry. The structure of the meeting was divided into three, starting with the strategies of the operators surrounding on-demand manufacturing (additive manufacturing (AM)), the thoughts, experiences, and use-cases from suppliers. In addition to a panel discussion where the necessary steps going forward were discussed between the different parties.

Among the presenting operators where; Equinor, Vår Energi, TotalEnergies and ConocoPhillips  
The presenting suppliers where; Aibel, DNV, Norseia and Siemens Energy

A total of around 100 people from different organizations attended the meeting.

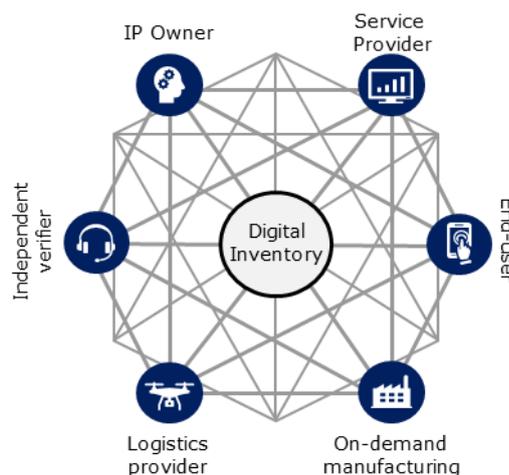


Figure 1.0 - The Digital Supply Network

The meeting, resulted in several main points, among these were:

- It is imperative to build trust around this topic, and there is a consensus that joint industry collaboration projects (such as the one in Offshore Norge) are essential to efficiently scale- and accelerate the journey. As an initial step, gaining knowledge and information sharing will be important to better understand and build competence around how these technologies should be adapted and implemented within internal strategies

- Further, it is crucial to align the interests and strategic needs between suppliers and operators to better understand how to build up strong delivery networks (figure 1.0), and how to design structures and capabilities needed to deliver upon these needs. In addition, the need to visualize roles in the supply network and gain understanding of demanded services is important to increase the uptake of investments. As an example, there are questions today regarding ownership of hardware and operating models which needs to be addressed
- The pace of adaption by suppliers will be crucial to reach the vision set forth (*Digital inventories and on-demand production is established as an operational, standard sustainable solution for the industry*) (see picture below) and understanding use cases and applications is necessary to align new services. These services could be; *off-site and on-site repair jobs, design for AM, welding services, QA/QC and certification services, logistics, engineering services- and consulting..etc.*

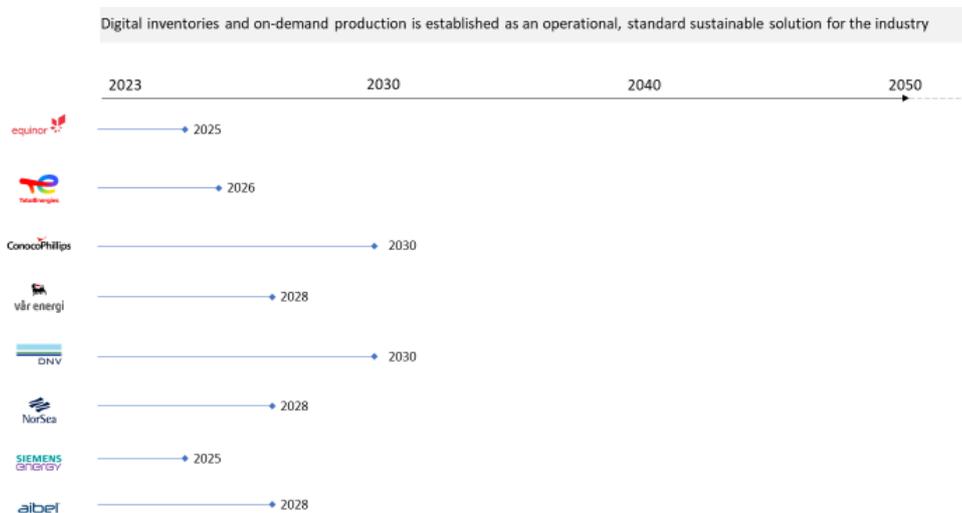


Figure 1.2 – Vision and target dates

- Standardization of materials- and processes is also imperative to scale to an industrywide adaption of on-demand manufacturing. Moreover, the need to share qualifications and documentations for parts is essential to build trust in parts and components. Additionally, the current standards need to be updated, and characterizing materials will be an important driving force
- Today, operators have started to identify suitable use cases for AM, but willingness for suppliers to adapt will be the key to unlock significant amount of use cases and application of AM. For instance, there is a large amount of data residing at supplier’s premises, and this data will be crucial to increase uptake of use cases, and scale up the application of AM. However, there are currently questions on how to better exploit this data
- Further, we see the need for incentive models, particularly on how contracts and agreements are manufactured. To incentivize suppliers, operators are investigating different measures for use of additive manufacturing. One of these measures could be value sharing

mechanisms. Particularly new field development projects and other greenfield projects could be deemed suitable. Although we expect that these measures should also be adapted into former agreements, especially for brownfield installations where older obsolete parts and components could show positive business cases for AM

- Moreover, the contracts and agreements will likely have clauses that take into consideration ESG (Environmental, social, governance) KPIs, where reduction of scope (1-2-3) emissions should be highlighted by the different manufacturing methods. Today there are no industrial standard KPI matrix for sustainability impact of on-demand manufacturing.
- In addition, we could see a future where frame agreements and contracts where operators will ask specifically for suppliers who can offer products and services digitally, and connected to digital platforms (digital inventories)
- Adaption of on-demand manufacturing will change status quo of project deliverables in many spheres. Change management is therefore a key driving factor to succeed, and this is needed both internally within organizations as well as within the supply network. It is advised that entities in the supply network starts investigating where they can provide value using on-demand manufacturing and coherent services.

Both operators and suppliers agreed on continuation of work on this important topic. To build on the momentum, the project team in Offshore Norway will develop a process guideline which will seek to highlight the process from A to B, and identify further bottlenecks that should be addressed both internally and externally.

The work will be shared with the industry to further accelerate adaption of on-demand manufacturing services.

Collaboration projects between operators are already running through Offshore Norway, and the same set up could be replicated for suppliers as well through Norsk Industri.