HARDMAN&CO.

27 November 2019

Technology

Source: Refinitiv

Market data

EPIC/TKR	**ASAI.SE**
Price (SEK)	**10.2**
12m High (SEK)	90.0
12m Low (SEK)	9.60
Shares (m)	24.7
Mkt Cap (SEKm)	252
EV (SEKm)	444
Free Float*	30%
Market	Nasdaq First North

**As defined by AIM Rule 26*

Description

Artificial Solutions is a leading global vendor of conversational artificial intelligence (AI) software to multinational enterprises. Headquartered in Sweden, the company comprises around 106 people.

Company information

CEO	Lawrence Flynn
CFO	Chris Bushnell
Chairman	Åsa Hedin
	+46 8 663 5450
	www.artificial-solutions.com

Diary

4 Nov 2019	3Q'19 earnings
27 Feb 2020	4Q'19 earnings
28 Apr 2020	Annual report 2019
18 May 2020	1Q'20 earnings
30 Jul 2020	2Q'20 earnings

Analyst

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ARTIFICIAL SOLUTIONS

Conversational AI leader; customer wins continue

Artificial Solutions (AS) is a market leader in the conversational artificial intelligence (AI) segment. Its customers include some of the world's largest enterprises across market sectors, while partners include many of the leading systems integrators (SIs) globally. Revenue growth remains strong, driven by major new customer wins and expanded existing customer commitments. The relevance of AI chatbots to robotic process automation is a further growth driver as enterprises evolve their IT infrastructures.

- **3Q'19 results:** Order intake growth remained strong at 65% YoY to SEK6.1m, while order backlog was up 101% YoY to SEK46.9m. 3Q net sales were SEK12.8m, up 33% YoY, with an adjusted EBITDA loss, as expected, of SEK26.9m. Growth was again driven by a combination of direct and indirect customer wins, together with contract extensions and renewals from the existing customer base.

- **Three new customers added in 3Q:** These comprised an additional Volkswagen brand, Scania; a global recruitment company; and a US Government department. . This followed 7 new wins in 2Q'19. 43% of revenue in 3Q came via SI partners, up from 34% in 2Q'19. SIs are providing access to customers that would otherwise be tricky to access, the US Government a key example.

- **AI adoption gaining momentum:** Industry forecasts indicate accelerating implementation of AI, conversational chatbots in particular. AS is now established as a mainstream vendor, regularly listed alongside technology companies hundreds of times its size on all metrics. Its patents are also receiving regular forward citations, reflecting AS's clear focus on innovation.

- **Valuation:** The stock has fallen since the March 2019 listing on the Nasdaq First North exchange. Low exchange liquidity, gradual progress in educating the market on the company and sales of stock by investors in the company into which AS reversed are all factors. With a market cap of ca.€20m, the discount vs. the patent valuation of €115m is noteworthy.

- **Investment summary:** Operational progress continues to be in-line with stated targets, while management has prioritised refinancing of the debt that matures in 2020 - our expectation is that the new funding arrangements will comprise a mix of debt and equity. Accelerating enterprise take-up of conversational AI should create healthy demand for AS's industrial grade Teneo platform, with SI partners increasingly driving new customer acquisition worldwide.

Financial summary and valuation

Year-end Dec (€m)	2017	2018	2019E	2020E	2021E
Revenue	7.1	6.1	6.8	9.0	12.0
EBITDA	-6.8	-9.3	-11.9	-7.1	-6.0
EBITDA margin	-96%	-152%	-175%	-79%	-50%
EBIT	-9.4	-11.6	-14.0	-9.4	-8.6
PTP	-10.9	-14.2	-13.9	-9.2	-8.0
Net income	-10.9	-14.2	-13.9	-9.2	-8.0
EPS, diluted (€)	-0.4	-0.6	-0.6	-0.4	-0.3
EV/revenue	5.9	6.8	6.1	4.6	3.4
EV/EBITDA	-6.1	-4.5	-3.5	-5.8	-6.9
EV/EBIT	-4.4	-3.6	-3.0	-4.4	-4.8

Source: Hardman & Co Research

Investment summary

Artificial Solutions (AS) is a leading vendor of conversational AI solutions, or smart chatbots (i.e. chat robots) as these technologies are sometimes called. These are virtual assistants that can respond accurately and appropriately to customer queries based on a deep understanding of what the customer is seeking to do. Machine learning from millions of pieces of data is the method by which the chatbots gain the "intelligence" to engage in a conversation with the end-user.

AS was established in 2001 and has specialised in AI chatbots from the outset. The company's focus on innovation and technology leadership is reflected in the company's patents, which have received extensive forward citations in patents from major technology vendors such as Microsoft and Apple. Indeed, a recent independent valuation of the patent portfolio indicates the value of the patent portfolio to be in the range of $125m to $153m, far in excess of the company's current enterprise value.

The financial performance of the company has remained consistent with guidance, but enterprise sales cycles, particularly when selling to multinationals via partners, are inevitably often elongated. At the same time, the strong growth in backlog, including multi-year deals increases future visibility. Accordingly, we are tempering our revenue estimates for 2019-21, but continue to expect revenue growth of ca.40% in each of 2020 and 2021. Cashflow breakeven is expected in 4Q'20 with initiatives underway to ensure funding is in place through to this point.

Artificial Solutions – Hardman forecast summary

Year-end Dec. (€m)	2017	2018	2019E	2020E	2021E
Net sales	4.95	4.39	5.20	7.31	10.17
% growth yoy	*37%*	*-11%*	*19%*	*40%*	*39%*
Total income	7.06	6.09	6.82	9.02	12.02
% growth yoy	*37%*	*-14%*	*12%*	*32%*	*33%*
Total operating expenses	-13.85	-15.35	-18.74	-16.14	-18.05
% growth yoy	*23%*	*11%*	*22%*	*-14%*	*12%*
EBITDA	-6.79	-9.26	-11.92	-7.12	-6.03
EBIT	-9.44	-11.58	-14.01	-9.42	-8.56
Pre-tax profit	-10.93	-14.24	-13.87	-9.17	-8.02
Net income	-10.93	-14.24	-13.87	-9.17	-8.02

Source: Hardman & Co Research

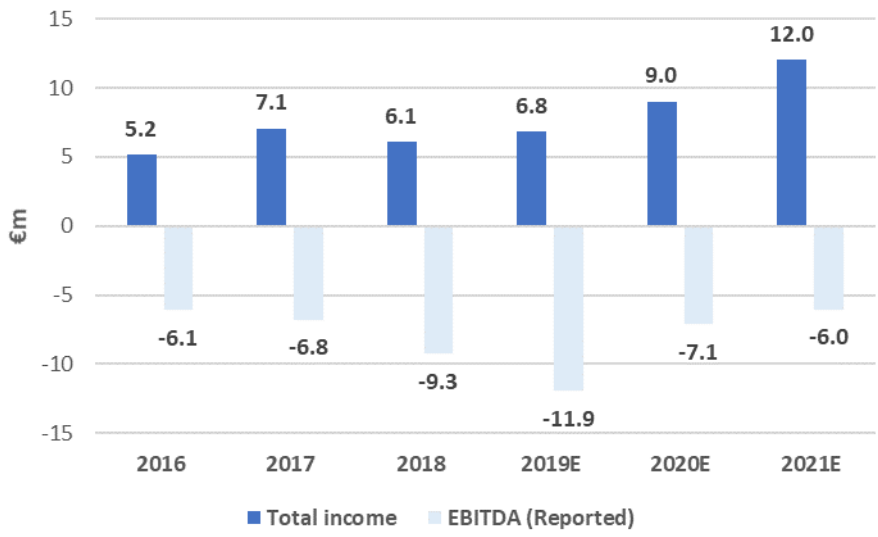
Customer acquisition is consistent with target milestones

In the context of the strategic objectives that management has clearly articulated, the company has continued to meet these targets. Accelerating order intake, a series of major additions, a growing representation of systems integrator (SI) led deals within the revenue mix and a corresponding uptrend in gross margin are all indicative of solid strategic execution.

3Q'19 order intake was up 65% YoY in a quarter that is seasonally weak (due to reduced selling days over the summer period) resulting in a 101% uplift in backlog. Reported revenue growth of 33% included 75% increase in usage revenue. The company won three new customers in 3Q, adding to the seven customers gained in 2Q'19. The total customer count stands at c.55 at present. An important trend is the growing number of customers that are moving from proof-of-concept phases to full production licences, which is captured in the licence revenue growth and usage revenue growth that AS is experiencing currently. In the past two quarters, management has highlighted strong customer renewal activity, which tends to come in two forms: (i) extensions of contract periods, say from one-year to three-year

periods (which, in turn, contributes to the increase in backlog); and (ii) increased commitment in terms of higher levels of usage bundles purchased in advance. Professional services engagements occasionally feature in renewals but are typically more relevant for new customers.

Artificial Solutions – Total income and EBITDA (€m)



Source: Company data, Hardman & Co Research

Market adoption of chatbots approaching full swing

Gartner Group's 2019 CIO survey indicated that ca.30% of larger enterprises have already deployed some form of conversational platforms, representing a 48% uptick year-over-year. Perhaps most notably, Gartner suggests that this "points to conversational platforms taking centre stage in enterprises' adoption of AI".

Enterprise drivers of AI chatbot adoption

1. Cost reduction / efficiencies	Substitution of enterprise human interaction with customers with multi-lingual conversational AI / chatbots offers scope to reduce customer service costs, call centre headcount and centralise operations in particular geographies.
2. Revenue expansion	Chatbots, when properly configured and implemented, should have a clear purpose, whether to drive revenue conversion rates or enhance customer service satisfaction ratios. The end-user is guided towards the preferred outcome.
3. Competitive differentiation	Amidst fairly dramatic shifts in how customers are seeking to interact with enterprises (retail banking is a stark example), chatbots and automated services that are available 24x7 signify innovation, convenience and a focus on customer care.

Source: Hardman & Co Research

The drivers of these trends are clear in terms of cost and productivity benefits. Conversational AI solutions offer returns on investment that are relatively

transparent. Handling customer queries using automated platforms delivers potentially substantial returns on investment, as described in the chart above.

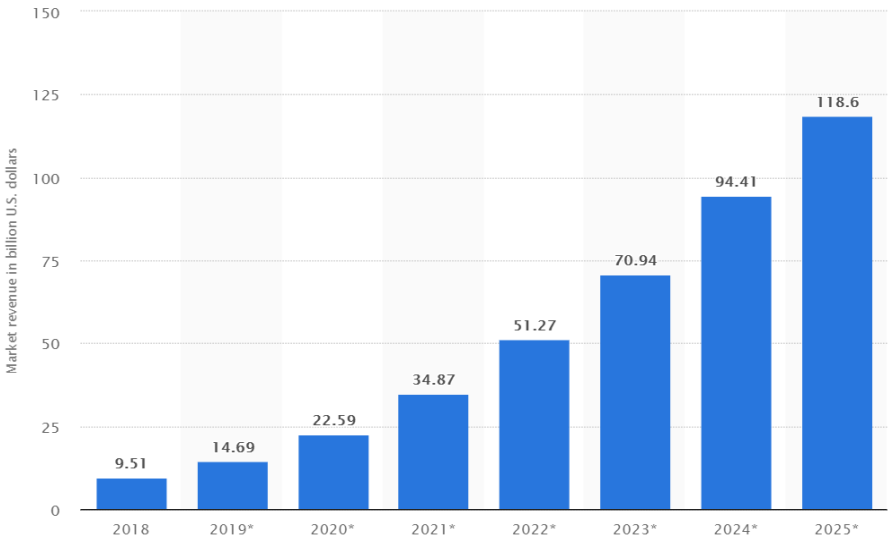
Market forecasts point to high growth rates

A report published by **Juniper Research** in July 2017 forecast $8bn of aggregate cost savings p.a. by 2022 from deployment of chatbots in the banking and healthcare sectors alone. This was from $20m of cost savings anticipated in 2017. The underlying assumptions included an improvement from a 20% success rate for chatbots in the banking sector in 2017 to 93% by 2022 and a time saving in excess of 4 minutes per chatbot enquiry compared with human call-centre interactions.

In October 2019**, P&S Intelligence** published a forecast for the size of the North American and European conversational AI market by 2024 of $15bn, from c.$3bn in 2018, representing a CAGR of 30.2% during that period. These regions are expected to represent 65% of the global conversational AI market by 2024. .

Looking back at previous **Statista** forecasts for the same worldwide AI segment, it is notable that forecasts have been exceeded. For 2018, for example, two years ago the forecast was $7.3bn, vs. the $9.5bn that was actually posted in that year, according to Statista itself. In turn, this has led to significant increases in near-term forecasts. In 2020F, Statista now forecasts $22.6bn, ca.30% higher than its previous forecast for the same year of $17.3bn. The reality is that the scope of AI and the applications that are being developed are broadening in scope continuously. The increase in market size is a combination of multiple factors, including the growing understanding among enterprises of the benefits to their operations, but also from a slew of new application areas that are coming to the fore addressing enterprise and consumer market segments.

Statista – Worldwide AI software revenue 2018-25F ($bn)



Source: Statista, 2019

AS established as a major AI vendor

A recent **Research for Markets** study of the global conversational AI market identified 11 top providers. Other than AS, the list included Google, Microsoft, IBM, AWS, Oracle, Baidu, SAP and Nuance. By any yardstick, this is a prestigious list of technology vendors and seems to confirm that AS's market presence and reputation now far exceed its actual headcount and scale of operations. However, size is not proving to be an impediment to winning major deals, assisted by growing levels of activity on the part of major SI partners.

In 2018, **ETR Research** published the results of its survey of approximately 700 enterprise CIOs from companies that it calculated represented ca.$300bn in annual IT spend (summarised in the chart below). Of these participating companies, 229 were in the top Global 2000 IT decision makers (ITDMs), and 66 were in the Fortune 100. The overlap between these enterprises and AS's target market is, therefore, significant. The results from AS's perspective are impressive, with the company ranking third among all "emerging technology companies to keep an eye on" and, perhaps even more significantly, considered to be the best-positioned company in its sector.

While these are only snapshots of the AI industry landscape, which is evolving fast, AS is capitalising on the high level of interest in terms of acquisition of large customers, many of which have numerous subsidiaries across which the Teneo platform is being progressively rolled out. Volkswagen is a good example in this regard, where this year alone, two additional subsidiaries have been added to the Teneo chatbot customer roster. These developments should also provide investors with comfort that the platform is delivering on customer requirements, in turn prompting sizeable repeat business from marquee customers.

ETR Research (2019) – Emerging technology companies to keep an eye on

Source: ETR Research, 2018

Transition away from consultancy revenue

The revenue mix continues to trend towards licences. Since completing the initial development of the core software platform, Teneo, in 2013, the company has focused on reducing its proportion of services revenue through engaging with SI partners to sell and implement its Teneo platform. Three primary drivers of this shift were:

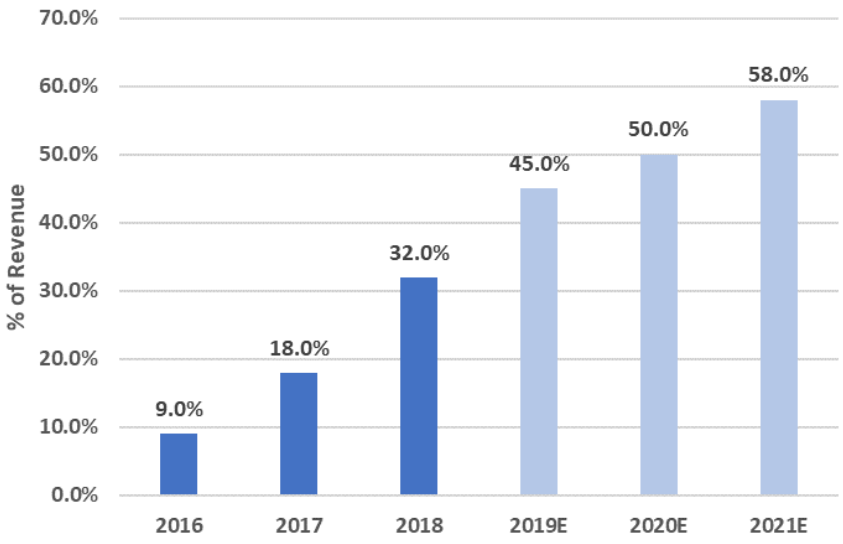
- the higher margins associated with software licence revenue;
- the greater predictability of term licence and usage-based revenue streams; and
- the scope to scale the customer base at a faster rate, with the benefit of SI partners actively selling the platform through dedicated AI practices worldwide.

The inevitable shorter-term impact of this transition, pending an uplift in usage revenue, has been a flatter profile in net sales, as services revenue continues to play a diminishing profile in the revenue mix. Going forward, this is expected to be far more than offset by the revenue backlog converting into revenue. The company's recurring revenue model means that revenue will build progressively over time, creating high levels of visibility.

Indirect sales focus

A key element of the AS strategy over the past few years has been the cultivation of a broad range of productive SI partnerships. Consistent with the focus on multinational enterprise customers, the SI partner base largely comprises major global integrators with deep enterprise relationships and a proven ability to deliver complex and highly scalable solutions. These names include Accenture, Capgemini, KPMG, Sapient, Deloitte, Teleperformance and Cognizant.

Artificial Solutions – % of revenue from systems integrator partners



Source: Company data, Hardman & Co Research

These relationships are evolving quickly from an implementation-led set of relationships with the SIs to growing evidence that the latter are able to sell the Teneo platform without significant, or, in some cases, any input from AS. During 2018, the company received its first two deals in which it had no involvement during the sales cycle, one with a payments service provider with KPMG and the other with a large Asian enterprise with Teleperformance. This continued in 2019 with two US Government department wins with Deloitte Federal, the contract win with the Circle K convenience store and petrol station chain with Accenture in the Nordics (which went directly to a production licence without a proof-of-concept) and a major US IT services win with CSGI.

New partnership announcements continue

In June 2019, AS confirmed an agreement with telecoms operator Swisscom, which has Swiss market shares for mobile and broadband in excess of 60%. The Teneo platform will be deployed to create language processing solutions for Swisscom's customers and employees. Swisscom has described Teneo "as one of the most exciting technologies around today".

A further partnership announcement was made in September 2019 with Babel Sistema de Informacion, an Iberian provider of services to customers primarily in the banking, telecoms and public sector verticals. Digital transformation services are a core element of Babel Sistema's activities and conversational AI is becoming a significant part of this service portfolio.

In mid-October 2019, AS announced a partner agreement with Mobinology, an established business software solution provider that focuses on enterprise data-driven marketing and customer engagement in Asia. Focusing on the Mobinology uses a range of AI and Cloud-centric technologies, a list to which AS has now been added. One interesting aspect of Mobinology's capabilities appears to be in the area of Robotic Process Automation (RPA) products, UiPath in particular. As we discuss below, the synergies between RPA and chatbots are potentially highly significant. Asia is already established as a key market for AS. In 1Q'19, the company announced a significant contract win with an Asian postal services organisation. This followed the opening of a satellite sales office in Singapore.

RPA is a major opportunity

AS management notes that the use of chatbots is a continuation of the journey of enterprise automation, with many enterprises seeking to expand their customer interaction capabilities across multiple channels without ramping up headcount. A key adjacent technology is RPA, which is a set of technology components that allow robots to emulate and integrate the actions of a human interacting within digital systems to execute a business process. RPA tools are particularly well-suited to processes with repeatable, predictable interactions with IT applications. Entire end-to-end processes can be performed by software robots with very little human interaction, the latter typically being required to manage exceptions. RPA is based on artificial intelligence and machine learning capabilities to allow the robots to handle high-volume, repeatable tasks.

RPA is seen as being a couple of years ahead of conversational AI in terms of take-up and now creates a compelling base of process automation deployments into which AS and its partners can sell Teneo solutions. There is an obvious interface between a chatbot and an RPA engine, whereby the chatbot feeds inputs into the RPA engine.

The RPA vendors, including major providers such as UiPath and Blue Prism, are seen as motivated to integrate with leading chatbots as conversations that are captured through automated interfaces will likely trigger a greater volume of transaction flow through their automated process platforms, in turn generating higher usage/transaction fees. Enterprises are beneficiaries of these seamless flows through greater automated processing and reduced cost, making them supporters of this growing trend in favour of closer integration. Notably, a key attribute of the Teneo Fusion module, which was launched earlier this year, is easier integration with RPA platforms.

Integration with automated communication platforms

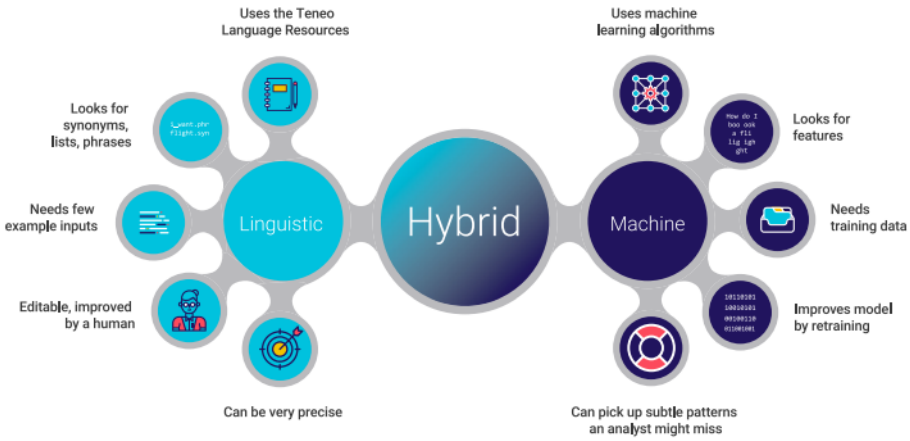
AS also envisages significant synergies from integrating Teneo with other constituents of the enterprise platform, highlighting automated multichannel communication providers such as Twilio and Nexmo, which are leveraging a variety of messaging and communication platforms and integrating them into single platforms for the enterprise. Management hinted that partnership discussions on this front are underway.

Teneo is world-class technology

Teneo is a highly advanced AI platform that offers enterprises a highly scalable, industrial-grade platform on which to build AI applications. It is designed to allow non-AI specialists to develop and implement conversational applications across their organisations, regardless of the industry in which they operate. The platform has been built and refined over a period of a decade by leading computational linguistic programmers and incorporates a data set comprising tens of millions of data points.

Every customer uses the same Teneo platform with no code changes across different customers. This unified platform supports all use cases across verticals. The "package" that each customer purchases contains all of the functionality required to build different applications. A key aspect of Teneo is the combination of natural language processing and machine learning algorithms to improve the AI models that are embedded in the platform.

Artificial Solutions – Teneo platform



Source: Company data

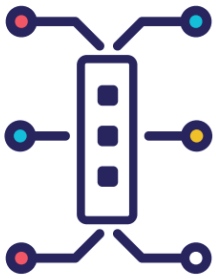
Ongoing product launches

The April 2019 launches of the Teneo Fusion and Teneo Developers applications, which are collectively designed to facilitate ease of use of Teneo by partners and end-customers. The response has been positive in terms of facilitating testing of the product in a sandbox environment and encourages the development of a community of third-party developers, which will generate add-on functionality deployable alongside Teneo.

1) **Teneo Developers** is a sandbox (i.e. test) environment, in which users can trial the Teneo product for 90 days with access to seven pre-configured bots and more than 30 prebuilt entities that customers can tweak to meet their own

requirements. Users are taken through the stages of building a bot, deploying it and then analysing its performance against the customer's objectives.

Artificial Solutions – Teneo Developers Sandbox



TENEO DEVELOPERS SANDBOX

Teneo Developers allows users to build, deploy and analyze conversational applications, with step by step guides, tips, trick and instructional videos. Registered users will get a developer sandbox containing all the tools needed to build and manage advanced conversational solutions.

Your Sandbox:

- Free for 90 days (renewable on request)
- 7 evaluation bots
- Unlimited intents
- >30 prebuilt entities
- Unlimited custom entities
- 5 Team members
- Cloud hosting
- English Language Resource

Teneo Developers takes you through three stages:

1. Building a bot

2. Deploying your bot

3. Analyze your bot

Source: Company data

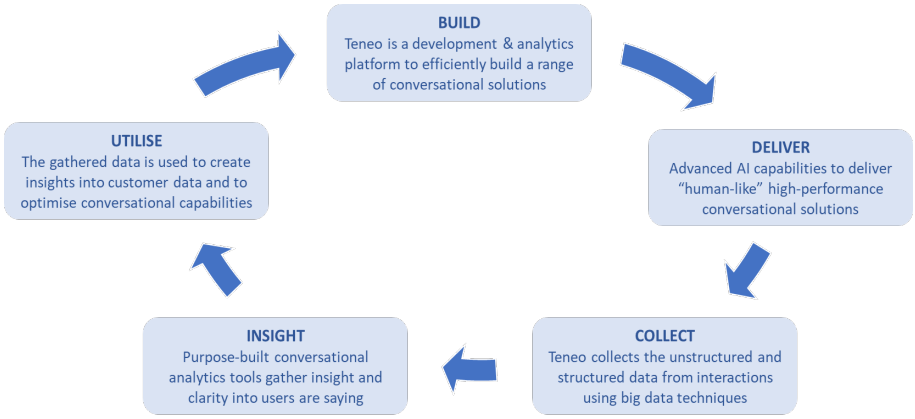
AS management notes that sales cycles are already being compressed by Developers. An example previously provided by management is that of an automotive manufacturer, which deployed the platform on the basis of a 30-day trial as part of a fast-track evaluation process and subsequently moved directly to a full contract rather than engage in a time-consuming proof-of-concept process. Understandably, the SIs are responding positively to these initiatives to make it easier to sell and deploy the Teneo platform. On its 3Q'19 earnings call, management noted that Teneo Developer has been an important part of scaling the company's ability to train and support partners without requiring expansion of AS's own headcount.

2) Teneo Fusion is a blend of enhancements to the current Teneo software platform, alongside business value measurements, to deliver the ultimate conversational AI experience for enterprise. It enables enterprises to dramatically improve the quality of their conversational AI systems, while taking control of the chatbot landscape and demonstrating clear business value within the organisation. Teneo Fusion delivers the technology that allows CIOs to enable both developers and business users to collaborate on building the ultimate conversational experience and provides the capability to enable integration with existing data sources as well as emerging technologies like Robotic Process Automation (RPA) and mixed-reality to deliver truly immersive, conversational experiences.

3) Teneo Connectors, is the most recent product launch, released in November 2019 and comprises a library of prebuilt connectors allowing enterprises to easily integrate a wide variety of back-end systems and processes such as RPA into their conversational AI interface to deliver more intelligent responses based on the back-end actions, requests and processes.

The Teneo platform is constantly collecting data to generate insights, which are analysed using the purpose-built tools embedded in the platform, in order to optimise its capabilities. It is not only structured data that is collected by Teneo, but also unstructured; for example, the transcript text of an online chat between a customer services representative and a consumer. The resulting data sets are huge, a topic that we come on to later in this section. It is this data that Teneo uses to learn and optimise its algorithms so that the quality of conversations is consistently improved. New product launches tend to fall within the workflow categories in the chart below. Enhancement and functionality enhancement projects are ongoing in most of these areas.

Artificial Solutions – Teneo process workflows



Source: Company data, Hardman & Co. Research

Fundraising initiatives

Artificial Solutions remains loss-making and hence has working capital requirements to fund losses prior to achieving cashflow breakeven. Management has noted its disappointment that new funding arrangements were not finalised prior to the 3Q'19 earnings release, which led to the auditors' qualification of the accounts in this respect. However, discussions with multiple parties continue with a view to making announcements relatively soon. After the end of 2Q'19 (on 1 July 2019), AS completed a fundraising through the issue of 2.74m new shares at €24.0, producing gross proceeds of SEK65.7m (€6.1m). Our estimates assume that a refinancing takes place in 4Q'19/1Q'20, with a movement of some debt on the balance sheet to long-term liabilities, together with an expansion of the total debt to fund operating losses in 4Q'19 and FY'20.

Risks

Competing with some of the world's largest technology companies brings challenges, such as keeping pace with developments, retaining talented people and creating enterprise mindshare vs. strong brands. SIs are a route to market but may reduce the company's visibility into potentially lengthy sales cycles. However, to date, AS has proven adept at managing these factors. Funding is invariably a risk factor for a company such as AS that is experiencing cash burn as it invests in further product/platform development and sales and marketing. The funding risk has been identified in the audit review report for the third quarter, which notes that a capital injection is required.

Financials

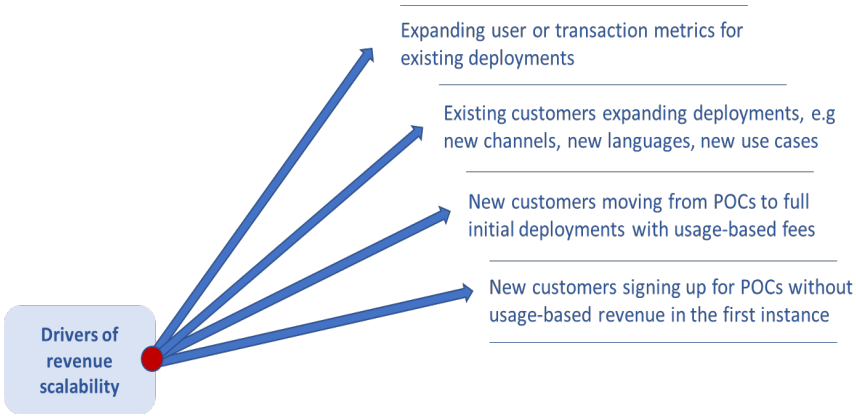
Summary

AS's revenue model is inherently scalable, with multi-year term licences and compulsory support agreements that will over time serve to create high levels of revenue visibility. New customers will more often than not engage in a pilot deployment of some description. Once the pilot or proof-of-concept has delivered on the customer's requirements, it will be migrated to a full production licence, which will trigger the payment of full licence fees and support contracts.

There are indications that pipeline customers are exhibiting a willingness to bypass pilot deployments in favour of moving directly to full deployments. In 3Q'19, one of the three customers added opted to move directly to a production licence. This is a function of multiple factors – the growing number of reference deployments of Teneo, a growing contribution to revenue by SI partners and launches by AS of the Teneo Developers module.

Over time, there should be the progressive growing importance within the revenue mix of usage revenue, which is driven by a combination of new production licences with upfront commitments to usage bundles and user growth/higher transaction volumes running through existing customer enterprise applications built on Teneo. As a consequence of these drivers, AS's revenue growth over the next few years is expected to materially exceed the growth rates of the Natural Language Processing (NLP) end-market. The latter is expected to grow at ca.35%-40% p.a. over the next five years.

Artificial Solutions – Drivers of revenue scalability



Source: Hardman & Co Research

Inherent revenue scalability

AS sells term licences that grant an enterprise the right to use its Teneo platform for a specified period – usually two or three years. Alongside the term licences, and associated support and maintenance contracts, each customer contract incorporates a usage-based revenue element. The nature of customer agreements varies in that some will contract for usage upfront, while other customers will only commit to licence revenue at the outset and pay usage-based fees as incurred. As such, the future revenue to come from existing customers is beyond that included in order backlog.

The enterprise-grade nature of the company's conversational AI capabilities allows the company to focus its attention on the largest enterprises with the highest numbers of users. The other side of the coin is that sales cycles are typically fairly extended and usually require pilot deployments in some form. However, once these enterprises have accepted that AS delivers on their requirements, the opportunity to scale revenue is substantial. The diagram above sets out the ways in which these deployments have, to date, tended to evolve.

3Q'19 results and Hardman estimates

Artificial Solutions – 3Q'19 results (€m)

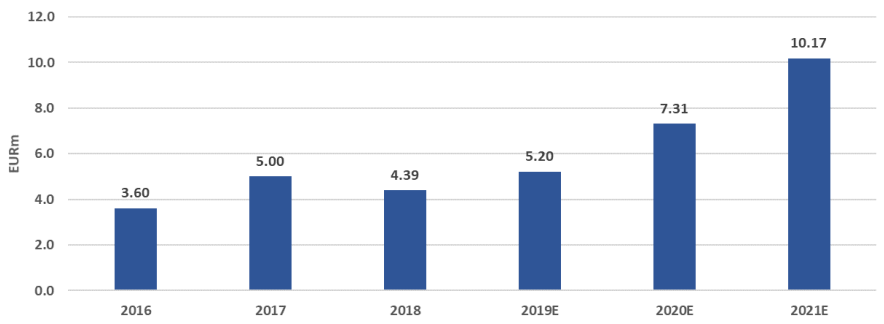
(€m, SEK:€=10.7)	3Q'19	3Q'18	FY'18
Net sales	1.2	0.9	4.4
Gross profit	0.8	0.5	2.0
Gross margin	62%	52%	45%
EBITDA	-2.5	-2.0	-9.8
Adjusted EBITDA	-2.5	-2.0	-9.8
Operating loss	-2.8	-2.5	-11.6
Adjusted operating loss	-2.8	-2.5	-11.6

Source: Company data, Hardman & Co Research

- Revenue increased by 33% in a quarter that exhibits seasonal weakness due to fewer selling days as a result of the summer holiday period. An important trend is the growing number of customers that are moving from proof-of-concept phases to full production licences, which is captured in the licence revenue growth and usage revenue growth that AS is experiencing currently.

- Usage revenue growth of 75% YoY was a noteworthy component of overall revenue performance in the quarter given that this element of revenue is success-based. In the past two quarters, management has highlighted strong customer renewal activity, which tends to include increased commitment in terms of higher levels of usage bundles purchased in advance.

Artificial Solutions – Net sales estimates (€m)

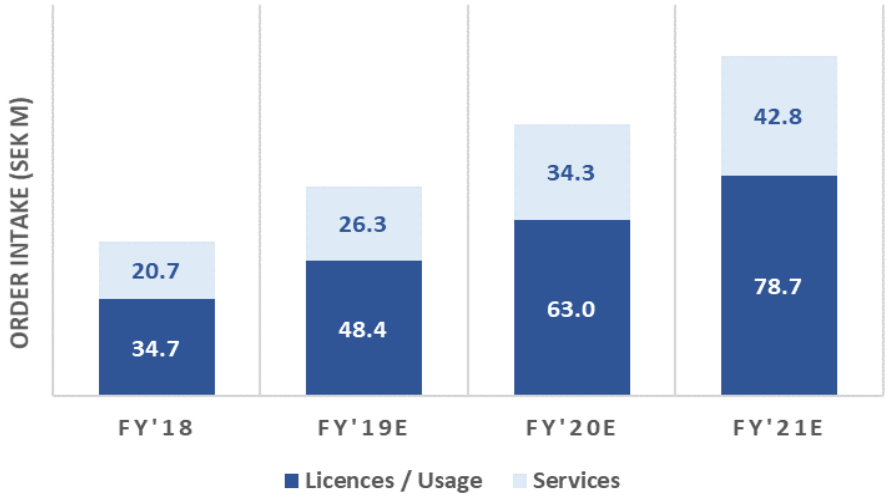


Source: Company data, Hardman & Co Research

- Strong order intake growth of 65% reflects a combination of new customer wins and renewal/contract extension activity among the existing customer base. The company's stated target is to grow its order intake in excess of the growth rate of the NLP market over the medium to longer term. SI partners are expected to account for a growing proportion of order intake – 66% in 3Q'19 – continuing the trend seen over the past three years. The order intake metric is confined to the

value of orders that are contractually committed during the period, with no inclusion of extrapolated transaction-based revenue.

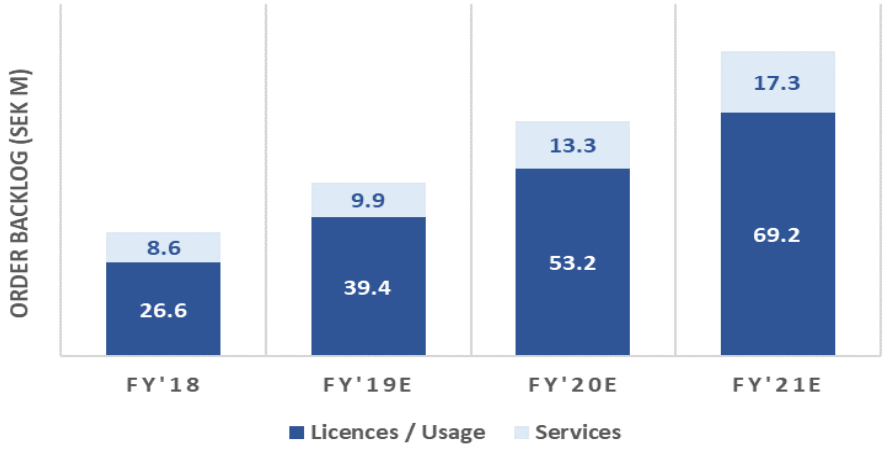
Artificial Solutions – Order Intake (SEKm)



Source: Company data, Hardman & Co Research

- The closing 3Q'19 order backlog was €4.4m (SEK46.9m), of which we expect ca.70% to convert into revenue in 2020, particularly licence revenue. Compared with the reported 3Q'19 net sales outturn of €1.2m, this represents significant contracted growth, without taking account of any additional conversions of proof-of-concepts into live deployments that are not contracted at this juncture. Order backlog comprises the value of contractually committed orders received from contractors that have not yet been recognised as revenue. This is a key metric upon which management places emphasis as a barometer of the future health of the business, while providing an indication of future revenue growth.

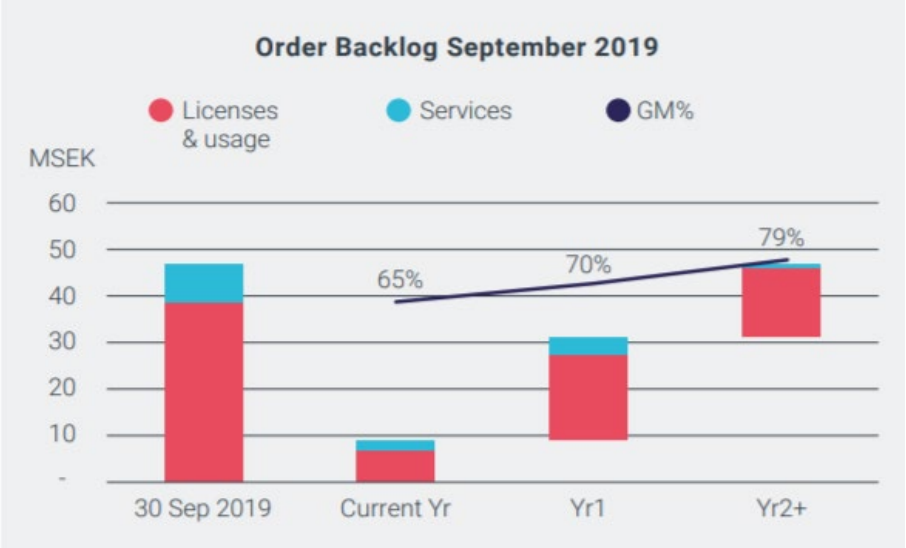
Artificial Solutions – Order backlog (SEKm)



Source: Company data, Hardman & Co Research

- Lengthening contract periods are a feature of new deals, consistent with growing customer confidence in the Teneo platform. As set out in the chart below, ca.31% of order backlog is due to be delivered in 2021 and beyond. The equivalent figure 12 months previously was less than 5%. The other notable metric is the rising gross margin profile of contracts as they progress into years 2 and 3, reflecting the higher proportion of professional services at the point of commencement of the contract together with growing (high margin) usage revenue in the later part of deployments.

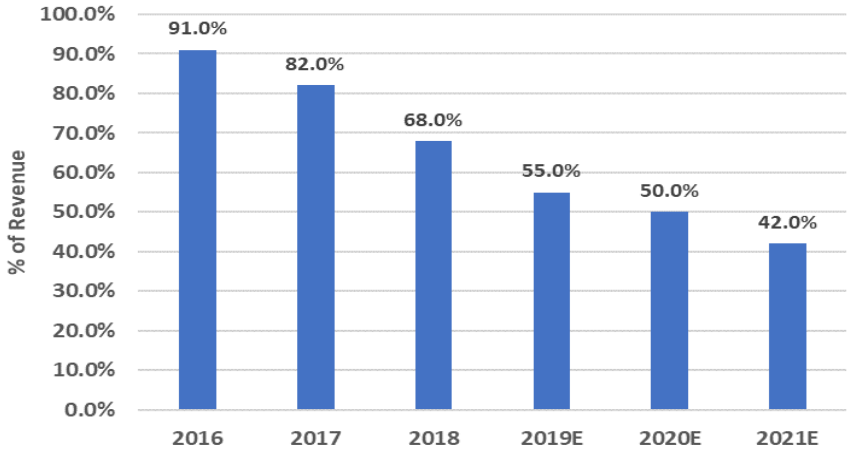
Artificial Solutions – Drivers of revenue scalability (SEKm)



Source: Company data

- Growth in the contribution from SI partners has remained consistent, representing 66% of order intake in 3Q'19, compared with 55% in 2Q'19 and only 10% in 1Q'19.

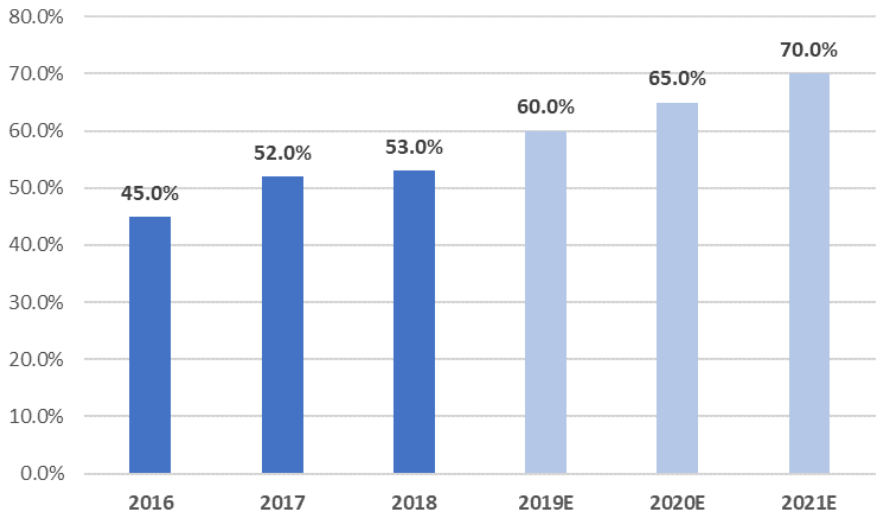
Artificial Solutions – % of revenue from direct sales



Source: Company data, Hardman & Co Research

- There was a material uplift in the gross margin in 3Q'19 to 62%, from 52% a year ago, reflecting the growing licence component within revenue and the reduction in professional services activity due to more SI involvement. The chart below reflects the significant gross margin increases that we have incorporated into our forecast revisions driven by the anticipated continuation of the transition away from consultancy/professional services revenue towards platform licence sales.

Artificial Solutions – Gross margin estimates (%)



Source: Company data, Hardman & Co Research

- At 106, the company's headcount at the end of 3Q'19 was relatively stable, up slightly from 104 a year ago, but within which there has been a marked transition away from services-centric people to greater pre-sales, sales and marketing heads. Personnel costs were up 7% YoY, in line with headcount increases, and reflecting the cost of shifting the mix of heads and the hiring of employees in the US and Asia-Pacific. Management does not anticipate a need to scale up headcount. R&D will remain a focus to support the company's existing position as a supplier of industrial-strength products. However, additional heads in this area are not required. Headcount increases are expected to be in IT, pre-sales, sales and partner alliance capabilities, but will be undertaken in a measured and modest fashion to ensure strong productivity.

- Cashflow from operating activities was an outflow in 3Q'19 of €2.6m, reflecting an increase in net finance costs partially offset by improved collections. Operating cashflow breakeven is expected in 4Q'20. Our cashflow figures include the 3Q'19 receipt of the ca.€6m raised in the equity placing that took place in June 2019.

- Payment terms are not coming under pressure, with all customers within a range of 30 to 60 days and this is not being affected by partner sales. Management notes that it will keep an eye on the working capital trend as usage sales through partners increases as a proportion of the revenue mix.

Artificial Solutions – Quarterly summarised results (SEKm)										
SEK (millions)	Q1 18	Q2 18	Q3 18	Q4 18	FY18	Q1 19	Q2 19	Q3 19	Q4 19E	FY19E
Income										
Net sales	12.4	11.4	9.6	11.5	44.9	12.6	12.6	12.8	17.5	55.5
Capitalised costs	2.9	3.2	2.1	4.0	12.2	2.3	2.6	2.6	2.6	12.8
Other operating income	0.0	0.0	0.0	5.3	5.3	0.0	0.0	0.0	0.0	0.0
Total income	**15.3**	**14.6**	**11.7**	**20.8**	**62.4**	**14.9**	**15.3**	**15.4**	**20.1**	**68.4**
Operating expenses										
Other external costs	-9.9	-11.4	-9.3	-20.9	-51.5	-17.7	-16.7	-13.4	-12.7	-60.5
Personnel costs	-26.3	-26.7	-22.9	-30.0	-105.9	-29.0	-28.5	-29.0	-29.9	-116.4
Other op. expenses	0.0	0.0	0.0	-0.1	-0.1	-22.1	0.0	-0.2	-0.2	-22.5
Total op. expenses	**-36.2**	**-38.1**	**-32.2**	**-51.0**	**-157.5**	**-68.8**	**-45.2**	**-42.6**	**-42.8**	**-199.4**
D&A	-7.2	-7.5	-5.1	-3.9	-23.7	-3.0	-3.1	-2.6	-2.7	-11.4
EBITDA	**-20.9**	**-23.5**	**-20.5**	**-30.2**	**-95.1**	**-53.9**	**-29.9**	**-27.2**	**-22.7**	**-131.0**
EBIT	**-28.1**	**-31.0**	**-25.6**	**-34.1**	**-118.8**	**-56.9**	**-33.0**	**-29.8**	**-25.4**	**-142.5**

Source: Company data, Hardman & Co Research

Revenue model

There are five primary elements to the AS revenue model:

(i) **Licence fees:** AS charges enterprises a licence fee to use its platform. These platform licence fees are term licences, typically spanning two to three years. The customer must have an active licence in order to continue using the Teneo platform. It is feasible that these contract periods will be extended as the applications built on Teneo become more entrenched into their customers' IT environments and deliver significant returns on investment.

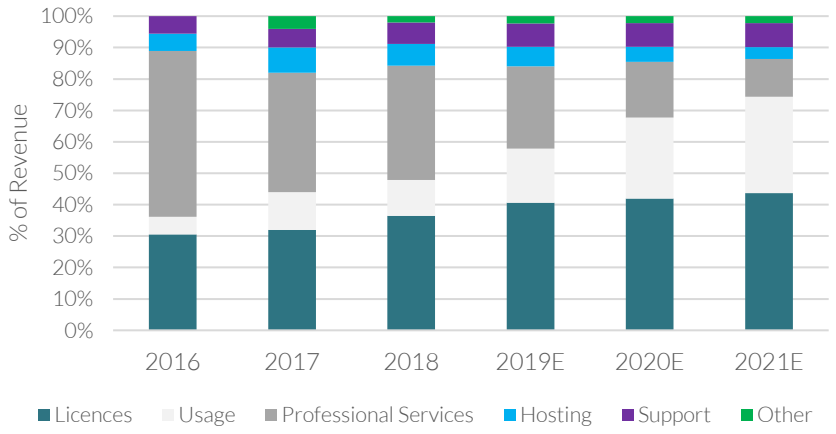
(ii) **Support fees:** In addition, there is an annual support and maintenance fee of 17% of the upfront licence fee. This is in line with standard software industry practice, and covers minor platform updates, bug fixes and the provision of technical support, although much of the latter will be delivered by SI partners. The annual support and maintenance is compulsory, alongside the annual term licence fee, in order for the customer to continue to use the product.

(iii) **Usage fees:** Today, usage fees represent a modest part of the revenue base, reflecting the relatively early stage of many of the customer deployments. However, usage revenue growth is accelerating and is expected to grow substantially as end-user interactions on the applications that have been built on Teneo scale in number. For example, one of AS's major telecom customers pays a usage fee of per active user per month.

(iv) **Professional services:** AS continues to maintain a professional services capability, but management has consistently sought to reduce services revenues in recent years, in favour of leaving implementation and integration services to SI partners.

(v) **Hosting services:** The company does have the capability to host deployments in a dedicated data centre capacity, but this is a diminishing part of the revenue line. Most new customer deployments tend to be on-premise, or the hosting services are provided by SI partners.

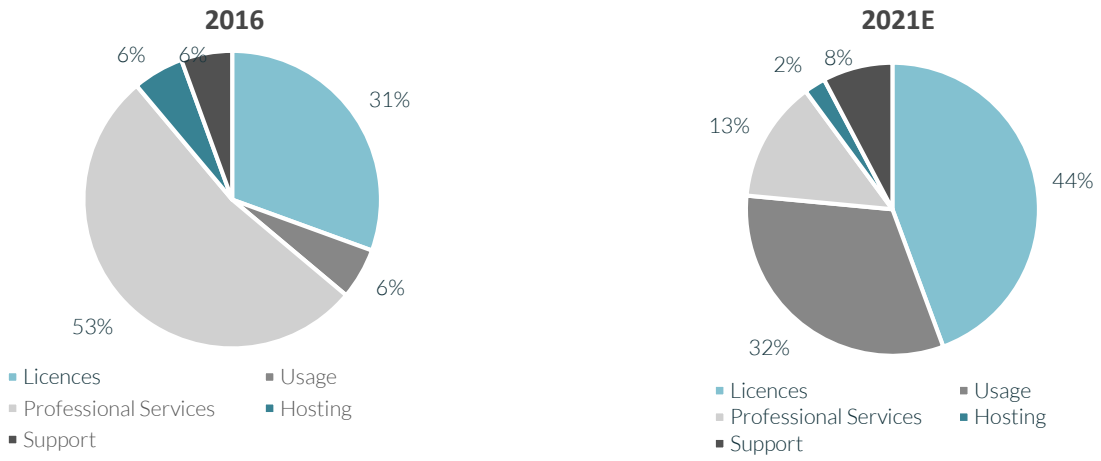
Artificial Solutions – Evolving revenue breakdown (%)



Source: Company data, Hardman & Co Research

The revenue mix continues to trend towards licences. Since completing the initial development of the core software platform, called Teneo, in 2013, the company has focused on reducing its proportion of services revenue through engaging with partners to sell and implement its Teneo platform. The benefits to AS include significantly enhanced margins and improved revenue scalability.

Artificial Solutions – Revenue breakdown FY'16 and FY'21E (%)



Source: Company data, Hardman & Co Research

Revenue estimates

Artificial Solutions – Evolving revenue breakdown (%)						
Year-end Dec. (€m)	2016	2017	2018	2019E	2020E	2021E
Licences	1.10	1.60	1.60	2.11	3.06	4.44
% growth YoY	-	*45%*	*0%*	*32%*	*45%*	*45%*
% of total revenue	*31%*	*32%*	*36%*	*41%*	*42%*	*44%*
Usage	0.20	0.60	0.50	0.90	1.89	3.12
% growth YoY	-	*200%*	*-17%*	*80%*	*110%*	*65%*
% of total revenue	*6%*	*12%*	*11%*	*17%*	*26%*	*31%*
Professional Services	1.90	1.90	1.60	1.36	1.29	1.23
% growth YoY	-	*0%*	*-16%*	*-15%*	*-5%*	*-5%*
% of total revenue	*53%*	*38%*	*36%*	*26%*	*18%*	*12%*
Hosting	0.20	0.40	0.30	0.32	0.35	0.38
% growth YoY	-	*100%*	*-25%*	*8%*	*8%*	*8%*
% of total revenue	*6%*	*8%*	*7%*	*6%*	*5%*	*4%*
Support	0.20	0.30	0.30	0.39	0.55	0.78
% growth YoY	-	*50%*	*0%*	*29%*	*42%*	*43%*
% of total revenue	*6%*	*6%*	*7%*	*7%*	*8%*	*8%*
Other	0.00	0.20	0.09	0.12	0.16	0.22
% growth YoY	-	*100%*	*-55%*	*35%*	*35%*	*35%*
% of total revenue	*0%*	*4%*	*2%*	*2%*	*2%*	*2%*
Sales	3.60	5.00	4.39	5.20	7.31	10.17
% growth YoY	-	*39%*	*-12%*	*19%*	*40%*	*39%*

Source: Company data, Hardman & Co Research

Profit and loss estimates

Artificial Solutions – Hardman profit and loss estimates (€m)						
Year-end Dec., (€m)	2016	2017	2018	2019E	2020E	2021E
Income						
Net sales	3.62	4.95	4.39	5.20	7.31	8.56
Capitalised costs	0.64	0.87	1.19	1.20	1.38	1.59
Other operating income	0.90	1.23	0.52	0.41	0.33	0.26
Total income	**5.16**	**7.06**	**6.09**	**6.82**	**9.02**	**10.41**
Operating expenses						
Other external costs	-3.38	-4.28	-5.02	-5.73	-2.53	-1.87
Personnel costs	-7.87	-9.57	-10.33	-10.91	-11.73	-12.29
Other operating expenses	0.00	0.00	0.00	-2.10	-1.89	-1.70
Total operating expenses	**-11.25**	**-13.85**	**-15.35**	**-18.74**	**-16.14**	**-15.86**
EBITDA (Reported)	**-6.10**	**-6.79**	**-9.26**	**-11.92**	**-7.12**	**-5.45**
Adj. EBITDA excl. capitalised costs	-6.73	-7.67	-10.45	-13.13	-8.51	-7.04
Depreciation & amortisation	-2.29	-2.64	-2.32	-2.09	-2.30	-2.53
EBIT (Reported)	**-8.39**	**-9.44**	**-11.58**	**-14.01**	**-9.42**	**-7.98**
Adj. EBIT excl. capitalised costs	-9.03	-10.31	-12.77	-15.21	-10.80	-9.57
Interest income	0.28	0.45	0.37	0.12	0.15	0.17
Interest expenses	-2.06	-1.94	-3.02	-2.07	-2.20	-2.16
Net financial income	-1.78	-1.49	-2.66	-1.95	-2.05	-1.99
Pre-tax profit	**-10.17**	**-10.93**	**-14.24**	**-13.87**	**-9.17**	**-7.44**
Adj. PTP excl. capitalised costs	-10.81	-11.80	-15.42	-15.08	-10.56	-9.03
Taxation	0.00	0.00	0.00	0.00	0.00	0.00
Net income	**-10.17**	**-10.93**	**-14.24**	**-13.87**	**-9.17**	**-7.44**

Source: Company data, Hardman & Co Research

Balance sheet estimates

Artificial Solutions – Hardman balance sheet estimates (€m)					
Year-end Dec. (€m)	2017	2018	2019E	2020E	2021E
ASSETS					
Fixed intangible assets					
Capitalised expenditure for licences & software	3.11	2.87	2.80	3.11	3.27
Goodwill	0.77	0.00	0.00	0.00	0.00
Total intangible assets	**3.87**	**2.87**	**2.80**	**3.11**	**3.27**
Fixed tangible assets					
Equipment, furniture & fittings	0.23	0.17	0.17	0.21	0.27
Total tangible fixed assets	**0.23**	**0.17**	**0.17**	**0.21**	**0.27**
Total fixed assets	**4.10**	**3.04**	**2.97**	**3.33**	**3.54**
Other non-current receivables	0.52	0.54	0.52	0.52	0.52
Total non-current assets	**4.62**	**3.58**	**3.50**	**3.85**	**4.06**
Current assets					
Accounts receivable - trade	0.40	0.56	1.29	1.74	2.35
Tax receivable	0.37	0.88	0.00	0.00	0.00
Other receivables	0.09	0.33	0.69	0.76	0.84
Prepaid expenses & accrued income	0.58	0.47	1.22	1.34	1.48
Total current receivables	**1.44**	**2.24**	**3.20**	**3.84**	**4.66**
Cash & bank balances	0.49	4.56	0.76	0.81	-0.01
Total current assets	**1.93**	**6.80**	**3.96**	**4.65**	**4.65**
TOTAL ASSETS	**6.55**	**10.39**	**7.46**	**8.50**	**8.71**
EQUITY & LIABILITIES					
Equity					
Share capital	3.09	3.65	4.16	4.16	4.16
Share premium reserve	62.78	75.57	103.16	103.16	103.16
Other equity including result for year	-73.39	-87.64	-124.56	-133.74	-141.76
Total equity	**-7.53**	**-8.43**	**-17.25**	**-26.42**	**-34.44**
Long-term liabilities					
Liabilities to other lenders	2.54	5.10	16.00	26.00	34.00
Total long-term liabilities	**2.54**	**5.10**	**16.00**	**26.00**	**34.00**
Current liabilities					
Liabilities to other lenders	7.78	9.13	4.33	4.55	4.77
Accounts payable - trade	0.40	0.36	1.64	1.64	1.64
Income tax liability	0.01	0.00	0.00	0.00	0.00
Other liabilities	0.24	0.35	0.00	0.00	0.00
Accrued expenses & deferred income	3.12	3.87	2.74	2.74	2.74
Total current liabilities	**11.54**	**13.71**	**8.70**	**8.92**	**9.15**
TOTAL EQUITY & LIABILITIES	**6.55**	**10.39**	**7.46**	**8.50**	**8.71**

Source: Company data, Hardman & Co Research

Cashflow estimates

Artificial Solutions – Hardman cashflow estimates (€m)					
Year-end Dec., (€m)	2017	2018	2019E	2020E	2021E
Operating loss	-9.44	-11.58	-14.01	-9.42	-8.56
Depreciation	2.64	2.32	2.09	2.30	2.53
Other items excluded from cashflow	0.32	0.03	0.00	0.00	0.00
	-6.47	**-9.23**	**-11.92**	**-7.12**	**-6.03**
Interest received	0.36	0.30	0.12	0.15	0.17
Interest paid	-0.89	-1.74	-2.07	-2.20	-2.16
Taxation paid & received	0.14	0.00	0.00	0.00	0.00
Operating cashflow before working capital changes	-6.86	-10.67	-13.87	-9.17	-8.02
Changes in working capital					
(Increase)/Decrease in receivables	0.36	-1.96	-0.96	-0.64	-0.82
Increase/(Decrease) in liabilities	0.36	0.82	-5.01	0.22	0.23
Net change in working capital	**0.72**	**-1.14**	**-5.96**	**-0.43**	**-0.59**
Cashflow from operating activities	**-6.14**	**-11.81**	**-19.84**	**-9.60**	**-8.61**
Investing activities					
Purchases of tangible fixed assets	-0.06	-0.03	-0.03	-0.04	-0.06
Purchases of intangible fixed assets	-0.88	-1.24	-0.62	-0.31	-0.16
Change in fixed assets	0.00	0.00	0.00	0.00	0.00
Cashflow from investing activities	**-0.94**	**-1.27**	**-0.65**	**-0.35**	**-0.21**
Financing activities					
Issue of new shares	3.83	12.82	6.10	0.00	0.00
Costs of new share issues	-0.19	-0.35	-0.31	0.00	0.00
Issue of new non-registered shares	0.00	0.00	0.00	0.00	0.00
Change in loans	3.12	4.68	10.90	10.00	8.00
Cashflow from financing activities	**6.76**	**17.15**	**16.69**	**10.00**	**8.00**
Net change in cash & cash equivalents	**-0.32**	**4.07**	**-3.80**	**0.05**	**-0.82**
Cash & cash equivalents at start of year	0.81	0.49	4.56	0.76	0.81
Cash & cash equivalents at end of year	**0.49**	**4.56**	**0.76**	**0.81**	**-0.01**

Source: Company data, Hardman & Co Research

Valuation

Our approach to understanding the potential valuation of AS centres on a discounted cashflow (DCF) analysis. At the same time, we take account of a detailed valuation undertaken in 2016 of the company's intellectual property (IP) assets in the form of patents and software licences.

In summary, the DCF analysis produces a mid-point implied fair enterprise value of €92m and an equity implied fair value of €74m, while the most recent IP valuation analysis undertaken in 2019 generated a patent valuation range of $125m to $153m. These valuation outcomes compare with the current enterprise value of ca.€42m (SEK444m).

DCF valuation

Based on relatively conservative assumptions, which are set out in their entirety in the table below, we derive an implied enterprise value for the company of €93m, which, after the current net debt position of ca.€18m, equates to an equity value of €74m. In Swedish Krona, the implied equity fair value is SEK792m, which compares with the company's current market capitalisation on the NASDAQ First North Exchange in Stockholm of ca.SEK252m.

Artificial Solutions – Hardman & Co discounted cashflow analysis

Key inputs	
Terminal FCF growth rate	5.0%
Long-term sustainable EBIT margin	35.0%
Long-term tax rate on EBIT	20.0%
WACC	**10.0%**

Y/end December, €m	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	Terminal value
Revenues	**6.8**	**9.0**	**12.0**	**15.6**	**19.9**	**24.8**	**29.8**	**33.4**	**35.0**	
yoy growth	*12.0%*	*32.3%*	*33.3%*	*30.0%*	*27.0%*	*25.0%*	*20.0%*	*12.0%*	*5.0%*	
EBIT margin	-205.4%	-104.4%	-71.2%	7.5%	12.8%	18.0%	23.5%	29.0%	35.0%	
EBIT	**-14.0**	**-9.4**	**-8.6**	**1.2**	**2.5**	**4.5**	**7.0**	**9.7**	**12.3**	
Depreciation & amortisation	2.1	2.3	2.5	2.6	2.7	2.8	2.8	2.9	3.0	
Adj. EBITDA	**-11.9**	**-7.1**	**-6.0**	**3.8**	**5.2**	**7.2**	**9.8**	**12.6**	**15.3**	
Tax rate	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	10.0%	15.0%	20.0%	
Tax on EBIT	0.0	0.0	0.0	0.0	0.0	-0.2	-0.7	-1.5	-2.5	
Change in net working capital	-6.0	-0.4	-0.6	0.7	0.9	1.0	1.2	1.5	1.8	
Cashflow from operations	**-17.9**	**-7.5**	**-6.6**	**4.5**	**6.1**	**8.0**	**10.4**	**12.6**	**14.6**	
Capex	-0.7	-0.4	-0.2	-0.7	-1.1	-1.6	-2.1	-2.5	-3.0	
Unlevered free cash flow	**-18.5**	**-7.9**	**-6.8**	**3.8**	**4.9**	**6.4**	**8.3**	**10.1**	**11.6**	**231.4**
Year	1	2	3	4	5	6	7	8	9	10
Discount factor	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.14	2.36	2.36
Present value	**-16.9**	**-6.5**	**-5.1**	**2.6**	**3.1**	**3.6**	**4.3**	**4.7**	**4.9**	**98.1**

Note: based on medium-term assumptions from 2022E

Implied valuation metrics	EURm
Sum of 9-year cash flow	-5.4
Terminal value	98.1
Value of the firm	92.8
Net funds	-17.9
Total equity value	**74.9**
No.of shares in issue (m)	24.7
Fair value share price (EUR)	**3.0**
€:SEK exchange rate	10.7
Fair value share price (SEK)	**32.4**

Source: Hardman & Co Research

IP asset valuation

The patent portfolio has been revalued during 2019 by OxFirst, an independent valuation specialist. AS's patent portfolio consists of six patents, five of which have been granted and one for which a patent application has been submitted and further approval is pending. All of these patents are relatively recent, with publication dates ranging between 2013 and 2018 and are all geographically limited to the United States.

The table below, sourced from OxFirst, provides further details of the six patents and contains some details that are key to evaluation of patents, including claims count and forward and reverse citations. OxFirst notes that the patents primarily relate to natural language interaction and natural language processing, forms of AI that allow humans to interact with computerised applications and electronic devices in free-format, natural language, using speech, text, touch or gesture.

Artificial Solutions – Patent portfolio

Patent Number	Published	Claims Count	Reverse Count	Forward Count	Keywords
US8346563B1[6]	01/01/2013	3	6	133	Natural Language, Virtual Assistant, Interaction
US20130268260A1 US8892419B2	10/10/2013 18/11/2014	2	5 6	76 21	NL, VA, User Interface, Analytics Framework
US20140019116A1 US8903711B2	16/01/2014 12/02/2014	2	5 6	38 15	NL, VA, User Interface, Analytics Framework
US20140244712A1 US9172747B2	28/08/2014 27/10/2015	6	5 5	54 5	VA Network, VA brokers, connected-devices
US20150339376A1	26/11/2015	20	2	2	NL Analytics, Data Analytics, Machine Learning
US20180089572A1 US10068174B2	29/03/2018 04/09/2018	20	0 5	0 1	NL, Machine Learning, User-provided, Hybrid

Source: OxFirst

Overall, the patent portfolio has 177 forward citations (when only considering the granted versions where possible), 53 claims and 30 reverse citations.

OxFirst ascribes considerable importance to the first patent, which was published in 2013 and is deemed to be the "core patent" as it is important to in excess of 100 patents from key vendors in the natural language processing and related segments. The core patent accounts for 133 of the total forward citations, of which seven are worldwide. Microsoft is the largest source of these citations at 21. The second patent has been cited 27 times by Apple.

The valuation conclusions reached by OxFirst are set out in the table below, which they reach using a combination of two approaches: net present value and a "top down approach", the latter noted to be specific to patent valuation and a methodology that is stated to be used in legal matters relating to patents. Taking into account the value of the licensing opportunity and AS software platform market opportunity, OxFirst derives a valuation range of $125m to $153m, which at the mid-point represents a 44% uplift vs. the valuation reached in 2016.

Oxfirst 2019 AS patent valuation

	Basis	Upper ($m)	Lower ($m)	2016 Valn ($m)
Patents	Overall Market Opportunity	100.6	77.3	56.4
Software	Artificial Solutions Market Opportunity	52.3	47.3	40.2
Total		**152.9**	**124.6**	**96.6**

Source: Oxfirst, 2019, Hardman & Co. Research

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