

# NAND SERVICE - MEMORY RESEARCH

## Market & Pricing Monitors - 2019

*NAND market downturn continues into early 2019, with recovery expected in the second half.*

### WHAT ABOUT THE NAND SERVICE - MEMORY RESEARCH?

#### A full package:

The NAND Quarterly Market Monitor and the Monthly Pricing Monitor include the following deliverables:

- Excel database with all historical and forecast data
- PDF slide deck with graphs and comments/analysis covering expected evolutions
- Direct access to a Yole Développement analyst for one year, providing an opportunity for on-demand Q&A and discussions regarding trends, analyses, forecasts, and breaking news

#### Frequency:

Receive every quarter the updated Market Monitor documents and every month the updated Pricing Monitor documents

#### Options:

- Memory Research are available for DRAM, NAND and both

### MEMORY IS NOW THE PRIMARY MARKET SEGMENT FOR SEMICONDUCTOR PRODUCTS

The hyper-growth of the memory market in 2017-2018 has positioned both DRAM and NAND memory as leading devices within the semiconductor market. With the memory markets significantly impacting the semiconductor industry in terms of profits, capex, and sales, Yole Développement is publishing two monitors covering the fast-moving DRAM and NAND markets. Beginning in 2018, Yole Développement began publishing world-class research, data,

and insights covering the memory markets in quarterly installments that analyze the evolution of the DRAM and NAND markets in terms of revenue, shipments, capex, and near-term price evolution, as well as demand per market segment, DRAM and NAND technology evolution, and detailed profiles of main suppliers. Yole Développement will also provide DRAM and NAND monthly pricing monitors to track the price evolution of key components and packaged solutions.

### MEGATRENDS AND HDD REPLACEMENT ARE PUSHING NAND TO NEW HEIGHTS

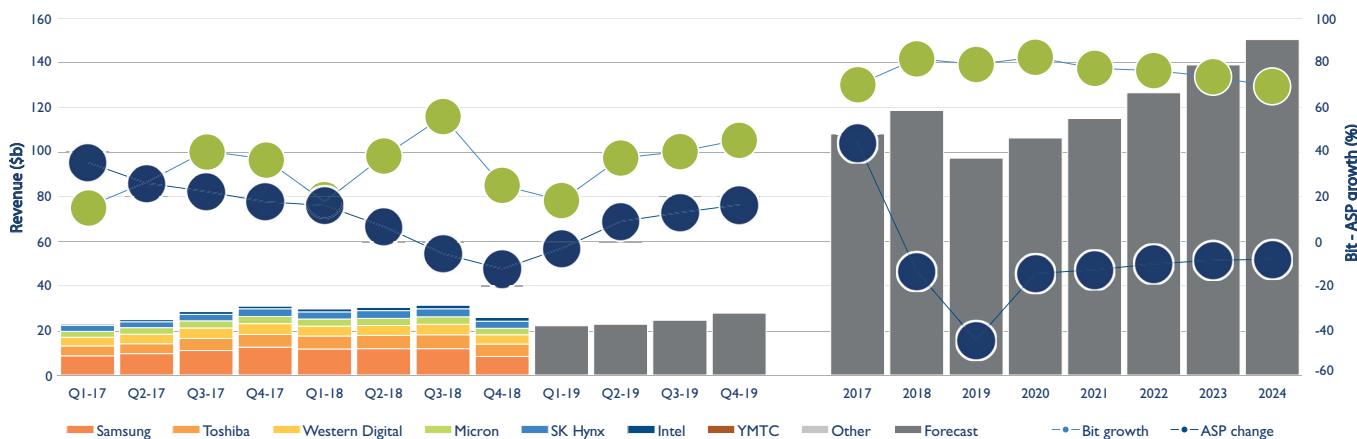
The long-term outlook for the NAND market is positive, despite the continued presence of seasonality and cyclicalities. Imbalances in supply and demand can cause market volatility in the short term, but emerging megatrends and the ongoing replacement of hard-disk drives (HDDs) with NAND-based solid-state drives (SSDs) are expected to push NAND to new heights.

Capital expenditures for the industry are increasing, in order to support the NAND architecture shift from planar (2D) to 3D structures and ongoing layer count growth. There are several announced or anticipated cleanroom additions which are needed to offset wafer throughput reductions as suppliers' ramp-up their process-intensive 3D NAND.

NAND's competitive landscape remains incredibly dynamic. Samsung is utilizing its massive new Pyeongtaek site and expanding its facilities in Xi'an, China; Toshiba Memory Corp. and its partner Western Digital continue to expand their footprint in Japan; Micron and SK Hynix remain competitive despite smaller manufacturing capacities; and Intel has emerged as a stand-alone supplier with capacity in China. Meanwhile, a new entrant looms on the horizon: China's Yangtze Memory Technologies Co. (YMTC), which threatens to disrupt the status-quo.

NAND demand remains robust, with strong growth for enterprise Solid-State Drives (SSDs) in data centers, increasing adoption of SSDs in laptop PCs, and continued content growth in

**NAND market dynamics per quarter**



(Yole Développement, March 2019)

smartphones and other mobile devices. These segments will continue driving the bulk of NAND bit consumption, though several emerging trends are poised to augment future growth, including AI and VR adoption, automotive, and IoT.

As the NAND market continues evolving, the industry faces many important questions, including:

- When will the NAND market shift from oversupply to undersupply, and vice-versa? How will supplier profitability be impacted? How does the price-elasticity of demand factor into the outlook?
- What are the limits of 3D NAND stacking? How will NAND suppliers continue to scale as 3D stacking's limits approach?
- To what extent will Quad-Level Cell (QLC)-based products reach the market, and from whom?
- Will YMTC's emergence disrupt the current market conditions?
- Will incumbent suppliers cede share to YMTC, or will a market-share battle erupt?

- Is Intel working with YMTC to supply 3D NAND and/or provide technology? If so, what are both companies' motivations?
- Why are NAND capital expenditures continuing to rise? Will capital intensity climb too high and threaten supplier stability?
- Will the NAND market eventually consolidate, similar to DRAM? How might this play out?
- How do changes in price impact market demand? Which market segments are impacted first?
- How do new megatrends like AI, machine learning, and virtual reality impact the NAND outlook? To what extent does NAND enable these?
- How will SSD form-factors and interfaces evolve over time?
- At what rate will SSDs replace HDDs in PCs?

Yole Développement answers these questions and provides opinions on a quarterly basis with its NAND Quarterly Market Monitor and NAND Monthly Pricing Monitor.

### WHAT CAN WE EXPECT IN THE UPCOMING QUARTERS?

After posting record revenue 2018, the NAND market is expected to decline in 2019 as the market attempts to overcome negative demand and pricing momentum from late 2018 and significant inventory builds. Revenue is expected to expand over time as cost reductions enable further penetration of NAND-based storage solutions into traditional HDD markets.

On the technology side, despite QLC's emergence, technology-driven bit growth will slow in the long-term as technology and manufacturing complexities continue rising.

Long-term ASP declines are expected to slightly

outpace industry cost declines due to China's new entrant, YMTC, which could begin production as early as 2019. Profit margins are expected to shrink, but the industry will remain profitable.

The differences in planar vs. 3D NAND process flows will shift capex focus from lithography to deposition and etching: substantial fab retooling is required to convert existing planar fabs to 3D. With increasing processing time for 3D NAND, major investments are required in new capacity to maintain flat wafer output during transitions, benefiting equipment vendors.

**NAND market forecast**

	Q1-18	Q2-18	Q3-18	Q4-18	Q1-19	Q2-19	Q3-19	Q4-19	Q1-20	Q2-20	Q3-20	Q4-20	2018	2019	2020	2021	2022	2023	2024
Revenue (\$m)	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX
% Change	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%
Shipments (m GB)	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
% Change	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%
ASP (\$/GB)	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX	\$XX
% Change	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%	X%

*(Yole Développement, March 2019)*

### NAND QUARTERLY MARKET MONITOR AND MONTHLY PRICING MONITOR - CONTENT

The NAND Quarterly Market Monitor and NAND Monthly Pricing Monitor provide all data related to NAND revenue per quarter, NAND shipments, pricing per NAND type, near and long-term revenue, market share per quarter, capex per company, and a market demand/supply forecast, along with a complete analysis and details on the demand side, with a deep dive into client and enterprise SSD, data centers, mobile, automotive, PC, and more.

For the top seven players (Samsung, Toshiba, Western Digital, Micron, SK Hynix, Intel, and YMTC), the NAND Quarterly Market Monitor offers a detailed analysis of capex, shipment, wafer production per technology (process mix) and per fab, as well as the expected impact of NAND technology changes.

The NAND Quarterly Market Monitor and the Monthly Pricing Monitor include the following deliverables:

- Excel database with all historical and forecast data
- PDF slide deck with graphs and comments/analysis covering expected evolutions
- Direct access to a Yole Développement analyst for one year, including opportunities for an on-demand Q&A as well as discussions regarding trends, analyses, forecasts, and breaking news.

**KEY FEATURES OF THE REPORT**

Get the sample of the report on [www.i-Micronews.com](http://www.i-Micronews.com)

- Market forecast through 2024 in GB, \$US, units, wafers, and \$/GB
- Supplier market share (Samsung, Toshiba, Western Digital, Micron, SK Hynix, Intel, YMTC, etc.) from 2015 - present, by revenue (\$US), bit shipments (GB), and geography (\$US)
- Supplier financial data: capital expenditures (\$US), capital intensity (%), average selling price (\$/GB), operating cost per bit (\$/GB), and operating margin (%)
- Detailed ASP forecast through 2020, by density for NAND components (SLC, MLC, TLC, QLC) and packaged solutions (eMMC, UFS, eMCP)
- Demand forecast through 2024, by category (i.e. client SSD, enterprise and other SSD, mobile, removable storage, automotive, and consumer) in units, revenue (\$US), bit demand (GB), and average density (GB/unit)
- Production forecast through 2020, by supplier for wafer production (wpm, by fab), bit production (GB, by fab), process mix (% of wafers), technology mix (bit basis), and average GB per wafer
- Emerging memory forecast for PCM (incl. 3D XPoint), in revenue (\$US), content (GB/system), average selling price (\$/GB), server, and PC attach rates

**TABLE OF CONTENTS** (complete content on [i-Micronews.com](http://i-Micronews.com))

**NAND Quarterly Market Monitor (PPT file)**

**NAND market overview**

- > Market dynamics
- > Revenue – Historical and forecast
- > Shipments
- > Blended pricing
- > Market shares – Revenue and bit shipments
- > Supplier ASPs
- > Sufficiency
- > Near-term shipment and pricing outlook
- > Capex
- > PCM forecast

**NAND demand**

- > Emerging demand drivers
- > Segment bit demand and share
- > Mobile
- > SSD – PC (client) and Datacenter (enterprise)
- > Automotive

**NAND supply**

- > Wafer production by supplier, process, and technology
- > Bit production by supplier, process, technology, and density
- > GB per wafer by supplier
- > SLC bit production and bit market share

**NAND supplier profiles**

- > New cleanroom updates
- > Samsung
- > Toshiba
- > Western Digital
- > Micron
- > SK Hynix
- > Intel
- > YMTC
- > Others

A complete Excel file with the analysis' numerical data is included with the PPT presentation

**NAND Monthly Pricing Monitor (Excel file)**

Monthly price evolution from 2018-2020 for:

**QLC NAND (\$/unit)**

- > 1Tb (128GB)

**TLC NAND (\$/unit)**

- > 128Gb (16GB)
- > 256Gb (32GB)
- > 512Gb (64GB)

**MLC NAND (\$/unit)**

- > 16Gb (2GB)
- > 32Gb (4GB)
- > 64Gb (8GB)
- > 128Gb (16GB)
- > 256Gb (32GB)

**SLC NAND (\$/unit)**

- > 1Gb
- > 2Gb
- > 4Gb
- > 8Gb (1GB)

**eMMC (\$/unit)**

- > 16GB TLC
- > 32GB TLC
- > 64GB TLC
- > 128GB TLC

**UFS (\$/unit)**

- > 32GB TLC
- > 64GB TLC
- > 128GB TLC
- > 256GB TLC

**eMCP (\$/unit)**

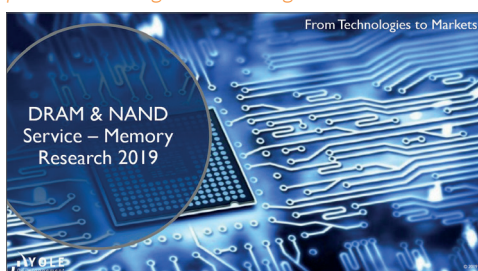
- > 16GB+8Gb LP3
- > 32GB+16Gb LP3
- > 64GB+24Gb LP3
- > 32GB+32Gb LP4
- > 64GB+32Gb LP4
- > 128GB+32Gb LP4
- > 128GB+48Gb LP4

**COMPANIES CITED IN THE REPORT (non exhaustive list)**

Samsung, Toshiba, Western Digital, Micron, SK Hynix, Intel, YMTC, and more...

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- Memory Packaging Market and Technology Report 2017

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**AUTHOR**

**Walt Coon** joins Yole Développement's Memory team as VP of NAND and Memory Research, part of the Semiconductor & Software division. Walt leads the day-to-day production of market updates, Market Monitors, and Pricing Monitors, focusing on the NAND market and semiconductor industries. He is also deeply involved in the business development of these activities. Walt has extensive experience within the memory & semiconductor industry. He spent 16 years at Micron Technology, managing a team responsible for competitor benchmarking, industry supply & demand, and cost modeling. His team also supported corporate strategy and mergers & acquisitions analysis. Before Micron, Walt worked at Information Systems, developing engineering applications to support memory process and yield enhancement. Walt earned a master's in Business Administration from Boise State University (Idaho, United States) and a B.S. in Computer Science from the University of Utah (United States).



# ORDER FORM

## NAND Service - Memory Research

### BILL TO

Name (Mr/Ms/Dr/Pr): \_\_\_\_\_  
Job Title: \_\_\_\_\_  
Company: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
State: \_\_\_\_\_  
Postcode/Zip: \_\_\_\_\_  
Country\*: \_\_\_\_\_  
\*VAT ID Number for EU members: \_\_\_\_\_  
Tel: \_\_\_\_\_  
Email: \_\_\_\_\_  
Date: \_\_\_\_\_

### PRODUCT ORDER

Please enter my order for:

- DRAM Service – Memory Research \$35 000
- NAND Service – Memory Research \$35 000
- Both DRAM & NAND Services – Memory Research \$60 000

- For price other than in dollars, please use the day's exchange rate. All reports are delivered electronically at payment reception. For French customers, add 20% for VAT

I hereby accept Yole Développement's  
Terms and Conditions of Sale<sup>(1)</sup>

Signature: \_\_\_\_\_

### PAYMENT

#### BY CREDIT CARD

- Visa       Mastercard       Amex

Name of the Card Holder: \_\_\_\_\_

Credit Card Number:

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Card Verification

Value (3 digits except AMEX: 4 digits):

□□□□  
□□ / □□

Expiration date:

#### BY BANK TRANSFER

BANK INFO: HSBC, 1 place de la Bourse,  
F-69002 Lyon, France,  
Bank code: 30056, Branch code: 00170  
Account No: 0170 200 1565 87,  
SWIFT or BIC code: CCFRFRPP,  
IBAN: FR76 3005 6001 7001 7020 0156 587

#### RETURN ORDER BY

- MAIL: YOLE DÉVELOPPEMENT, Le Quartz,  
75 Cours Emile Zola, 69100 Villeurbanne/Lyon - France

#### SALES CONTACTS

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+ 1 310 600-8267 – laferriere@yole.fr
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- Europe & RoW - Lizzie Levenez:  
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<sup>(1)</sup> Our Terms and Conditions of Sale are available at  
[www.yole.fr/Terms\\_and\\_Conditions\\_of\\_Sale.aspx](http://www.yole.fr/Terms_and_Conditions_of_Sale.aspx)  
The present document is valid 24 months from March 2019

### SHIPPING CONTACT

First Name: \_\_\_\_\_  
Email: \_\_\_\_\_

Last Name: \_\_\_\_\_  
Phone: \_\_\_\_\_

### ABOUT YOLE DEVELOPPEMENT

Founded in 1998, Yole Développement has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide covering MEMS and image sensors, Compound Semiconductors, RF Electronics, Solid-state lighting, Displays, Software, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management.

The "More than Moore" market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business.

#### CONSULTING AND ANALYSIS

- Market data & research, marketing analysis
- Technology analysis
- Strategy consulting
- Reverse engineering & costing
- Patent analysis
- Design and characterization of innovative optical systems
- Financial services (due diligence, M&A with our partner)

More information on [www.yole.fr](http://www.yole.fr)

#### MEDIA & EVENTS

- i-Micronews.com website and related @Micronews e-newsletter
- Communication & webcast services
- Events: TechDays, forums,...

More information on [www.i-micronews.com](http://www.i-micronews.com)

#### REPORTS

- Market & technology reports
- Patent investigation and patent infringement risk analysis
- Teardowns & reverse costing analysis
- Cost simulation tool

More information on [www.i-micronews.com/reports](http://www.i-micronews.com/reports)

#### CONTACTS

For more information about :

- Consulting & Financial Services: Jean-Christophe Eloy (eloy@yole.fr)
- Reports: David Jourdan (jourdan@yole.fr) Yole Group of Companies
- Press Relations: Sandrine Leroy (leroy@yole.fr)

**Definitions:** "Acceptance": Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by signing the purchase order which mentions "I hereby accept Yole Développement's Terms and Conditions of Sale".

**"Buyer":** Any business user (i.e. any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

**"Contracting Parties" or "Parties":** The Seller on one hand and the Buyer on the other hand.

**"Intellectual Property Rights" ("IPR")** means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, inventions, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

**"Products":** Depending on the purchase order, reports or monitors on MEMS, Imaging, SSL, Advanced Packaging, MedTech, Power Electronics and more, can be bought either on a unit basis or as a bundled offer (i.e. subscription for a period of 12 calendar months).

**"Report":** Reports are established in PowerPoint and delivered in a PDF format with an additional Excel file. 30 min of Q&A session with an analyst/author can be included for all purchased reports (except the ones bought in one user license). More time can be allocated on a fee basis.

**"License":** For the reports 3 different licenses are proposed. The buyer has to choose one license type:

- Single user license: one person at the company can use the report. Sharing is strictly forbidden.
- Multi-user license: the report can be accessed by an unlimited number of users within the company, but only in the country of the primary user. Subsidiaries and Joint-Ventures are excluded.
- Corporate license: the report can be used by an unlimited number of users within the company, but only in the country of the primary user. Subsidiaries are included, while Joint-Ventures are excluded.

**"Monitor":** Monitors are established and delivered in Excel. An additional PDF can also join it. Q&A with an Analyst is possible for each monitor with a maximum limit of 100h/year. Frequency of the release varies according to the monitor or service.

**"Seller":** Based in Villeurbanne (France, headquarters) Yole Développement provides marketing, technology and strategy consulting, media and corporate finance services, reverse engineering/costing services as well as IP and patent analysis. With more than 70 market analysts, Yole Développement works worldwide with the key industrial companies, R&D institutes and investors to help them understand the market and technology trends.

## 1. SCOPE

- 1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. ANY ADDITIONAL, DIFFERENT, OR CONFLICTING TERMS AND CONDITIONS IN ANY OTHER DOCUMENTS ISSUED BY THE BUYER AT ANY TIME ARE HEREBY OBJECTED TO BY THE SELLER, SHALL BE WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.
- 1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorized person representing the Buyer. For these purposes, the Buyer accepts these conditions of sales when signing the purchase order which mentions "I hereby accept Yole Développement's Terms and Conditions of Sale". This results in acceptance by the Buyer.
- 1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer's address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

## 2. MAILING OF THE PRODUCTS

- 2.1 Products are sent by email to the Buyer:
  - Within a few days from the order for Products already released and paid; or
  - Within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.
- 2.2 The Seller shall by no means be responsible for any delay in respect of article 2.1 above, and including in cases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.
- 2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.
- 2.4 The mailing is operated through electronic means either by email via the sales department or automatically online via an email/password. If the Product's electronic delivery format is

defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

- 2.5 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects.
- 2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer's risk.

## 3. PRICE, INVOICING AND PAYMENT

- 3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes (except for France where VAT will be added). The prices are re-evaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.
- 3.2 Payments due by the Buyer shall be sent by cheque payable to Yole Développement, credit card or by electronic transfer to the following account:
 

HSBC, 1 place de la Bourse 69002 Lyon France  
Bank code: 30056  
Branch code: 00170  
Account n°: 0170 200 1565 87  
BIC or SWIFT code: CCFRFRPP  
IBAN: FR76 3005 6001 7001 7020 0156 587

 To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.
- 3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the "BCE" + 7 points, in accordance with article L. 441-6 of the French Commercial Code. Our publications (report, database, tool...) are delivered only after reception of the payment.
- 3.4 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

## 4. LIABILITIES

- 4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.
- 4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement.
- 4.3 In no event shall the Seller be liable for:
  - a) Damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller's website or the Products, or any information provided on the website, or in the Products;
  - b) Any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.
- 4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.
- 4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.
- 4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labour costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for any event as set out in article 5 below.
- 4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages or cancellation of the orders, except for non-acceptable delays exceeding [3] months from the stated deadline, without information from the Seller. In such case only, the Buyer shall be entitled to ask for a reimbursement of its first down payment to the exclusion of any further damages.

4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of sale ability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

## 5. FORCE MAJEURE

The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labour difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.

## 6. PROTECTION OF THE SELLER'S IPR

- 6.1 All the IPR attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.
- 6.2 The Buyer agreed not to disclose, copy, reproduce, redistribute, resell or publish the Product, or any part of it to any other party other than employees of its company (only in the country of the primary user). The Buyer shall have the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:
  - Information storage and retrieval systems;
  - Recordings and re-transmittals over any network (including any local area network);
  - Use in any timesharing, service bureau, bulletin board or similar arrangement or public display;
  - Posting any Product to any other online service (including bulletin boards or the Internet);
  - Licensing, leasing, selling, offering for sale or assigning the Product.
- 6.3 If the Buyer would like to use data coming from the Products for presentations, press announcements and any other projects, the Buyer needs to contact Yole Développement's Public Relations Director (info@yole.fr) to get an official authorization and verify data are up to date. In return the Seller will make sure to provide up-to-date data under a suitable public format.
- 6.4 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Products and shall personally take care of any related proceedings, and the Buyer shall bear related financial consequences in their entirety.
- 6.5 The Buyer shall define within its company a contact point for the needs of the contract. This person will be the recipient of each new report. This person shall also be responsible for respect of the copyrights and will guaranty that the Products are not disseminated out of the company. In the context of Bundle and Annual Subscriptions, the contact person shall decide who within the Buyer, shall be entitled to receive the protected link that will allow the Buyer to access the Products.
- 6.6 Please note that whether in Bundles or Annual Subscription, all unselected reports will be cancelled and lost after the 12 month validity period of the contract.
- 6.7 As a matter of fact the investor of a company, external consultants, the joint venture done with a third party, and so on cannot access the report and should pay a full license price.

## 7. TERMINATION

- 7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.
- 7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

## 8. MISCELLANEOUS

All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the Buyer. Any notices under these Terms and Conditions shall be given in writing. They shall be effective upon receipt by the other Party. The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

## 9. GOVERNING LAW AND JURISDICTION

- 9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract/orders entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Lyon, which shall have exclusive jurisdiction upon such issues.
- 9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.