

# NAND QUARTERLY MARKET MONITOR

Memory Service - September 2020

*NAND market poised to emerge from downturn in 2020.*

## WHAT ABOUT THE NAND - QUARTERLY MARKET MONITOR?

### 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

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

## 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

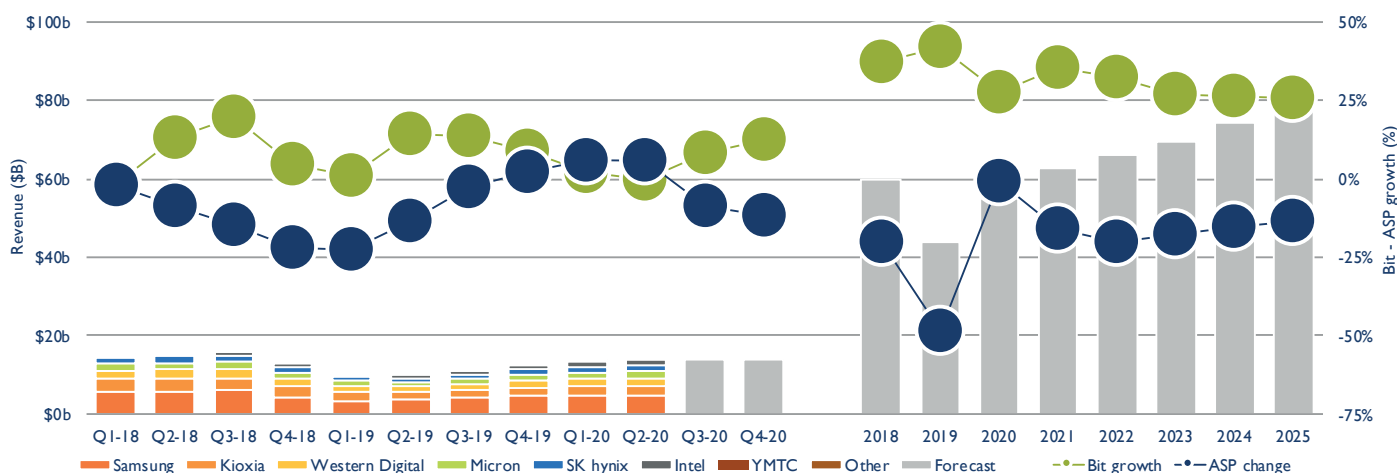
The long-term outlook for the NAND market is positive, despite the continued presence of seasonality and cyclical volatility. Imbalances in supply and demand can cause market volatility in the short term, but emerging megatrends and the ongoing replacement of hard-disk drives (HDDs) with NAND-based solid-state 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; KIOXIA Corporation 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

**NAND market dynamics per quarter**



(Yole Développement, September 2020)

SSDs in laptop PCs, and continued content growth in 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?
- 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 difficult NAND market conditions in 2019, the industry was poised for a strong rebound in 2020. However, impacts from COVID-19 and worsening trade tensions between the US and China are proving to be significant headwinds to the recovery. NAND 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 front, despite layer count growth and the emergence of QLC, technology-driven bit growth will slow as process and manufacturing complexities continue to rise. Long-term NAND ASP declines are

expected to slightly outpace industry cost declines due to the addition of YMTC from China to an already competitive market. Profit margins for the suppliers are expected to remain pressured in the absence of industry consolidation. The differences in planar vs. 3D NAND process flows have shifted 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 cleanroom space to maintain flat wafer output during transitions, benefiting equipment vendors.

### NAND market forecast



**NAND Quarterly Market Monitor 2020**  
NAND market forecast

	Q3-19	Q4-19	Q1-20	Q2-20	Q3-20	Q4-20	Q1-21	Q2-21	Q3-21	Q4-21	Q1-22	Q2-22	2019	2020	2021	2022	2023	2024	2025	
Revenue (\$m)	\$XX	\$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%	X%
Shipments (m GB)	XX	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%	X%
ASP (\$/GB)	\$XX	\$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%	X%

(Yole Développement, September 2020)

### 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, KIOXIA, 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.

**COMPANIES MONITORED IN THE PRODUCT (non exhaustive list)**

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

**TABLE OF CONTENTS** (complete content on i-Micronews.com)

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

**NAND market overview**

- > Market dynamics
- > Revenue – historical and forecast
- > Shipments
- > Pricing
- > Operating margins
- > Sufficiency
- > Near-term supply and pricing outlook
- > Capex
- > PCM forecast

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- > Revenue-based market share
- > Shipment-based market share
- > Regional market share
- > Segment market share

**NAND demand**

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- > SSD – PC (client) and Datacenter (enterprise)
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**NAND supply**

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- > Bit production by process, technology, and density
- > GB per wafer, by supplier
- > 3D NAND supplier roadmaps
- > SLC bit production and bit market share

**NAND supplier profiles**

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- > 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 looking back six months and forward 12 months:  
**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 NAND (\$/unit)**

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

**UFS (\$/unit)**

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

**eMCP (\$/unit)**

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

**KEY FEATURES OF THE MONITOR**

- Market forecast through 2025 in GB, \$US, units, wafers, and \$/GB
- Supplier market share (Samsung, KIOXIA, 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 2021, by density for NAND components (SLC, MLC, TLC, QLC) and packaged solutions (eMMC, UFS, eMCP)
- Demand forecast through 2025, 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 2021, 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



**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).

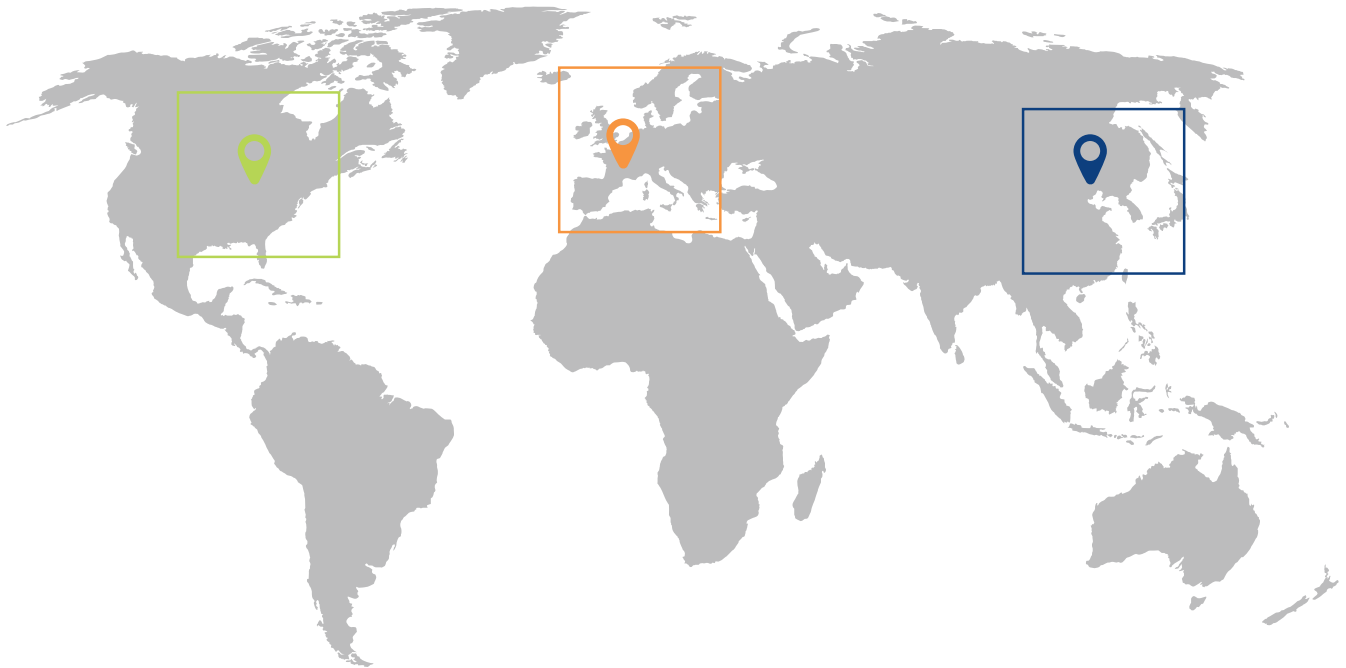
**RELATED REPORTS, MONITORS & TRACKS**



- DRAM Quarterly Market Monitor - Memory Service
- Emerging Non-Volatile Memory 2020
- Status of the Memory Industry 2020
- Application Processor Quarterly Market Monitor - Computing Service
- Advanced Packaging Quarterly Market Monitor - Packaging Service
- Teardown Tracks - by System Plus Consulting

More information and details about our offers and bundles opportunities on [www.i-micronews.com](http://www.i-micronews.com)

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## ABOUT YOLE DEVELOPPEMENT

Founded in 1998, Yole Développement (Yole) 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 120 collaborators worldwide covering MEMS and image sensors, Compound semiconductors, RF Electronics, Solid-state lighting, Displays, Software, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Power Electronics, Batteries & Energy Management and Memory.

The “More than Moore” market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and Blumorpho, supports 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, application & related e-newsletter
- Communication & webcast services
- Events: TechDays, forums...

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

### REPORTS & MONITORS

- Market & technology reports
- Market, reverse technology and patent quarterly monitors
- Patent investigation and patent infringement risk analysis
- Structure, process and cost analysis and teardowns
- Cost simulation tool

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

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Definitions: **“Acceptance”**: Action by which the Buyer accepts these General Terms and Conditions of Sale in their entirety. It is done by signing the purchase order which states “I hereby accept Yole Développement’s General 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) placing an order pursuant to these General Terms and Conditions of Sale, with the exclusion of any individual consumer acting for his/her sole personal interest.

**“Seller”**: Headquartered in Villeurbanne (France), 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 dedicated teams of technology & market analysts, Yole Développement operates worldwide with the key industrial companies, R&D institutes and investors to help them understand the market and technology trends.

**“Contracting Parties”** or **“Parties”**: The Seller on the 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”

Our products 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 as a one user license). More time can be allocated on a fee basis.

#### “Monitor”

Monitors are established and delivered in Excel. An additional PDF can also be added. Q&A with an Analyst is possible for each monitor (except where specified otherwise). Frequency of the release vary according to the monitor or service (quarterly and monthly). All monitor products are eligible for a Corporate License.

#### “Tracks”

Yearly subscription to access a web-based interactive portal to view features and specs of a device or component based on a complete turnaround process.

#### “License”

For the reports 3 different licenses are proposed. Buyer has to choose one license type:

- One User License: The report is intended for only one identified user at the Company purchasing the report - Sharing is strictly forbidden
- Multi-User License: The report can be shared by an identified user at the Company purchasing the report with an unlimited number of employees of said Company, working in the country where the identified user is based. No rights are granted to any employees of any Subsidiaries or Joint Ventures of the Company.
- Corporate License: The report or monitor can be shared by an identified user of the Company purchasing the report with an unlimited number of employees of said Company on a global basis. Subsidiaries controlled by the Company are included, however Joint Ventures involving the Company are excluded.

**DISCLAIMER:** Notwithstanding the fact that certain persons within an organisation may be entitled to access a report pursuant to a Multi-User or a Corporate License, Yole Développement shall in no event incur any liability in any form whatsoever, if Yole Développement should sell one or more licenses directly to any such persons.

#### 1. SCOPE

1.1 Both Contracting Parties undertake to comply with these General Terms and Conditions of Sale.

**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, ARE DEEMED WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER, AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.**

1.2 These General Terms and Conditions of Sale shall be deemed valid and enforceable between the Contracting Parties after acceptance of an order from the Buyer by the Seller pursuant to Article 1.3 below. For such purpose, the Buyer, when signing the purchase order which mentions “I hereby accept Yole Développement’s Terms and Conditions of Sale” is deemed to have fully and unequivocally accepted these Terms and Conditions of Sale.

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. In the absence of any confirmation in writing, no order shall be deemed to have been accepted.

#### 2. MAILING OF THE PRODUCTS

2.1 Products are sent by email to the Buyer after Seller’s confirmation:

- Within a few days from the Seller’s confirmation of 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 pursuant to Article 2.1 above, in particular in cases where a new event or access to new contradictory information would require the Seller analyst to dedicate extra time to compute or compare the data in order to enable the Seller to deliver a high quality Product.

2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in Article 3 above.

2.4. The mailing is operated through electronic means either by email via the sales department or automatically online via an email/password. The Buyer is responsible for ensuring that the Buyers platform has the required capacities and authorisations to receive the Product(s) emailed by the Seller. If the Product’s electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that the Seller 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 with 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 written notification from the Buyer to the Seller, even in case of delayed delivery. Any Product returned to the Seller without the Buyer providing prior notification to the Seller as required under Article 2.5 above shall remain at the Buyer’s risk. In no event shall the Seller incur any liability for Products erroneously ordered by the Buyer, or for any request from the Buyer to replace a Product previously ordered by a different Product.

#### 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 deemed to be inclusive of all taxes applicable in the country where the Seller is based (except for France where VAT will be added). The prices are re-evaluated from time to time by the Seller. 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, or made by 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 secure the payments due to the Seller, the Seller reserves the right to request down payments from the Buyer. In such case, the need for a down payment will be mentioned on the corresponding order.

3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except as otherwise specifically agreed in writing by the Buyer and the Seller. If the Buyer fails to pay at the due date and fails to request and obtain from the Seller a payment extension, 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.

3.4 The Seller publications (reports, monitors, tracks...) are due for delivery only after receipt by the Seller of any payment due by the Buyer prior to delivery.

3.5 In the event of termination of the contract by the Seller attributable to Buyer misconduct during the contract, the Seller will have the right to invoice all work performed at the time of termination, 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 the choice of the Products purchased as well as for the use and interpretations the Buyer makes of the documents it purchases, of the results the Buyer obtains, and of the advice and acts the Buyer bases thereon .

4.2 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 a Product or the use of or the inability by the Buyer to use the Seller’s website, or any information provided on the website, or contained in a Product;
- b) Any claim attributable to errors, omissions or other inaccuracies in a Product or interpretations thereof.

4.3 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.

4.4 Any Product that the Seller sells may, upon prior notice to the Buyer from time to time be modified by Seller or substituted with a similar Product meeting the needs of the Buyer. Such modification shall not lead to any liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.

4.5 In the case where, after inspection, it is acknowledged that a Product contain defects, the Seller undertakes to replace the defective product to the extent reasonably feasible and without indemnification or compensation of any kind for labour costs, delays, loss caused or any other reason being due by the Buyer . This undertaking from the Seller shall be effective for a maximum of two months starting from the delivery date but shall not be applicable in the event of force majeure as described in Article 5 below.

4.6 The deadlines that the Seller is asked to provide for the mailing of a Product are given for information purposes only and are not guaranteed. If such deadlines are not met, this shall not, without the agreement of the Seller lead to any claim for damages or right of cancellation of one or more orders by the Buyer, except for non-acceptable delays exceeding [3] months from the stated deadline. In such case only i.e. only in the event of a delay exceeding (3) months from the stated deadline the Buyer shall be entitled to ask for a reimbursement of any down payment previously made to the Seller, to the exclusion of any other damages.

4.7 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 any 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 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, epidemics, major health event (e.g. Corona virus), equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not attributable to 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 a Product, or any part of it to any other party other than employees of the Buyer Company (and only in the country of the Primary User for Multi-User Licenses). The Buyer shall have the right to use Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use any 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 a Product or any derivative thereof.

6.3 If the Buyer would like to use data coming from a Product 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 confirm that the 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 for any infringement of the obligation described in Article 6.3 above, whether such infringement originates from the Buyer’s employees or any person to whom the Buyer has sent the Products. Furthermore, the Buyer shall initiate and personally take care of any related proceedings in coordination with the Seller, and the Buyer shall bear the related financial consequences in their entirety.

6.5 The Buyer shall define within its Company an identified user who shall serve as a contact person for the License purchased by the Buyer. This person will be the recipient of each new report. This person shall also be responsible on behalf of the Buyer, for compliance with all copyrights and other obligations relating to the protection of the Seller’s IP rights and general compliance with the terms of the License purchased by the Company. In the context of Bundle and Annual Subscriptions, the contact person shall decide within the Buyer which person(s) shall be entitled to receive the protected link that will allow the Buyer to access the Products.

6.6 It is acknowledged and accepted by the Buyer that whether purchased in the form of Bundles or Annual Subscription, all unselected reports will be deemed cancelled and lost after a period of 12 month following acceptance of the corresponding order by the Seller in accordance with provisions of Article 1.3 above .

6.7 It is further acknowledged and agreed by the Buyer that any investor in the Buyer Company, any external consultant of the Buyer Company or any joint venture done with a third party in which the Buyer Company is involved , is not entitled to use a Product, without paying to the Seller the full price for a license to the required Product..

#### 7. TERMINATION

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 incurred by the Seller, pursuant to such cancellation or postponement.

#### 8. MISCELLANEOUS

8.1 All the provisions of these General Terms and Conditions of Sale are for the benefit of the Seller, but also for that of its licensors, resellers and agents. Each of them is entitled to assert and enforce these provisions against the Buyer.

Any notices under these Terms and Conditions shall be given in writing and shall be effective upon receipt by the other Party.

8.2 The Seller may, from time to time, update these General Terms and Conditions of Sale, and the Buyer, shall be deemed to have accepted the latest version of such General Terms and Conditions of Sale, once they have been duly communicated to the Buyer by the Seller.

#### 9. GOVERNING LAW AND JURISDICTION

9.1 Any dispute arising out or linked to these General Terms and Conditions of Sale or to any Licenses or Products purchased in application thereof shall be submitted to the French Commercial Court of Lyon, which shall have exclusive jurisdiction upon such issues.

9.2 French law (without reference to any applicable conflict of law provisions) shall apply to these General Terms and Conditions of sale and any agreement between the Buyer and the Seller made pursuant thereto.