

STATUS OF THE MEMORY INDUSTRY 2021

Market & Technology Report - June 2021

NAND consolidation, China's bet on two key players, the rise of the CXL interface: as the memory business narrows, the market keeps growing and is poised to exceed \$200B in 2026.

WHAT'S NEW

- Analysis of wafer production, bit shipments, CAPEX, and memory demand in the post-pandemic era
- Description and analysis of storage drives and memory modules with their key protocols and interfaces (e.g., DDR5, HBM2E, CXL)
- Updated market forecast (2020 - 2026) for NAND and DRAM, considering the impact of trade wars and the rise of new players from China
- Update on the NOR Flash memory business: supply-demand dynamics, players, growth drivers, applications, market shares, revenue, and more
- Updated financial analysis of leading IDM companies – including Samsung, SK hynix, Kioxia, Western Digital, Micron, and Intel
- Updated list of Chinese memory players and detail of their activities in the DRAM, NAND, NOR, and emerging NVM businesses

KEY FEATURES

- Summary of the stand-alone memory market and related technologies, including NAND, DRAM, persistent memory, computational storage, NOR, (NV) SRAM, emerging NVM, and more
- Description of technical trends and manufacturing challenges, scaling roadmaps, and players
- Overview of the storage drive and memory-module businesses
- Breakdown of the memory market from a system point of view, detailing present and future memory needs for servers, smartphones, personal computers, enterprise/client SSDs, and vehicles
- Profile of the most important end-markets for stand-alone memory, i.e., data centers, mobile, automotive, PC, and consumer electronics
- Overview of embedded memory technology and progress towards in-memory computing applications
- Mapping of the stand-alone memory supply chain, analysis of recent M&A and joint ventures, and list of noteworthy news

AMID THE PANDEMIC, TRADE-WAR TENSIONS, AND CHIP SHORTAGES, THE MEMORY MARKET OUTLOOK REMAINS BRIGHT. REVENUES WILL PEAK IN 2022 AT MORE THAN \$180B

In modern data-centric societies, semiconductor memory is a ubiquitous technology and represents an impressive market (>\$120B in 2020) with solid growth potential driven by important megatrends, including mobility, cloud computing, Artificial Intelligence (AI), and the Internet of Things (IoT). NAND and DRAM are the workhorse memory technologies and are used, respectively, as storage and working memory for a broad spectrum of applications and systems, including smartphones, tablets, SSDs, PCs, servers, and vehicles. Both markets are cyclical in nature, as they are characterized by periods of shortages and oversupply that give rise to strong price variations and revenue volatility. After substantial oversupply in 2019 – with Average Selling Prices (ASPs) down 49% year-over-year for both NAND and DRAM – overall market conditions improved in 2020 despite trade-war tensions and the outbreak of Covid-19. The pandemic had a mixed impact on the memory industry: data center and laptop demand grew, automotive and smartphones faced a slowdown. The net outcome has been a relatively balanced memory demand, while NAND/DRAM production started slowing down as memory suppliers significantly underinvested in new wafer capacity. As a

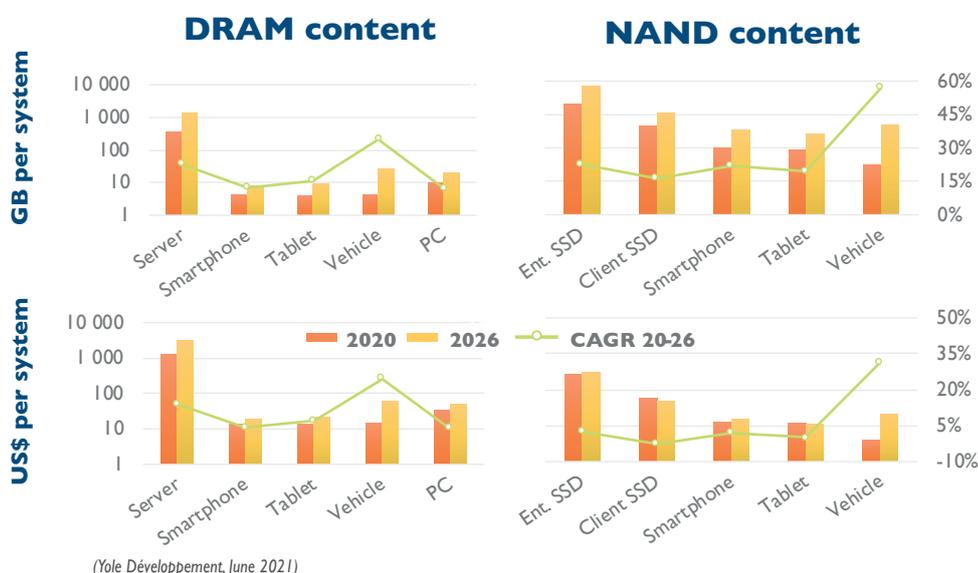
result, combined DRAM and NAND revenue rose 15% from 2019, reaching ~\$122B in 2020.

In the present semiconductor shortage era, the storage-drive industry is facing a scarcity of SSD controllers and other NAND sub-components, which causes supply chain uncertainty and puts pressure on ASPs. The recent shutdown of Samsung's manufacturing facility in Austin, which manufactures NAND controllers for its SSDs, further amplifies this situation and will likely accelerate the NAND pricing recovery, particularly in the PC SSD and mobile markets where impacts from controller shortages are most pronounced.

Thanks to a combination of CAPEX cuts from suppliers in recent years and flourishing demand, the future is looking bright, particularly for DRAM. Revenues will peak again in 2022, reaching record-high values of \$120B (DRAM) and \$68B (NAND).

In the long term, DRAM and NAND revenues are expected to grow to \$81B (NAND) and \$124B (DRAM) with CAGR₂₀₋₂₆ of ~11% and ~6%, respectively. In the same period, the ASP is expected to decrease by ~7% (DRAM) and ~16% (NAND), driven by cost-per-bit reductions enabled by technology scaling.

2020-2026 evolution of the average DRAM and NAND content for key end-systems



(Yole Développement, June 2021)

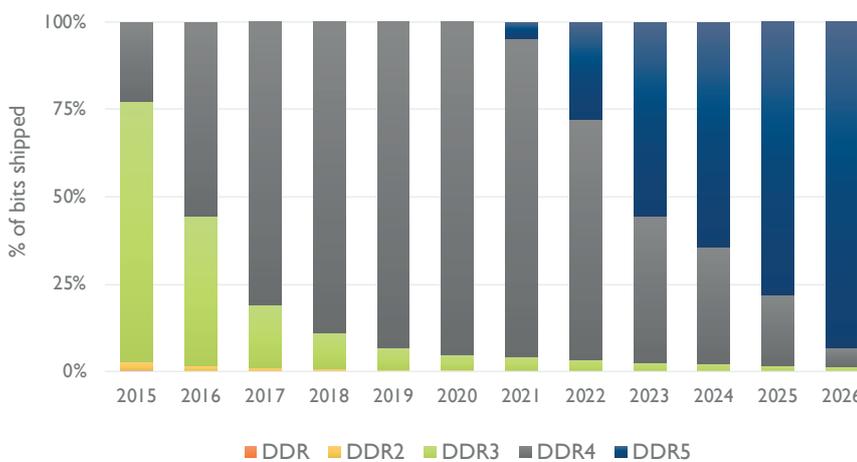
THE MEMORY-PROCESSOR INTERFACE IS KEY FOR OVERCOMING THE “MEMORY WALL”. CXL AND DDR5 WILL ENABLE THE NEW WAVE OF DATA-INTENSIVE APPLICATIONS

The processor-memory interface is rapidly evolving to meet growing performance needs from data-intensive applications, which are being hampered by the so-called “memory wall”, a bandwidth limitation associated with data transfer between the memory and the processing unit. DDR5 DRAM is the latest updated to the Double Data Rate (DDR) standard and will significantly boost performance compared to DDR4. The new specification brings

lower voltage and moves Power Management ICs (PMICs) onto the memory module. It doubles the maximum data rate and increases the die density by a factor of 4 (up to 64Gb). The production of DDR5 memory is now gaining momentum, with all leading DRAM manufacturers having already finalized their mainstream DDR5 designs. SK hynix announced that they are ready to start shipping DDR5 memory to module manufacturers, and Micron to delete announced sampling of DDR5 memory based on the Iznm technology, targeting RDIMMs for servers. The DDR5 memory standard will be utilized by upcoming Intel and AMD platforms that are expected to be launched later this year. We expect a veritable takeoff of DDR5 will occur from 2022. Besides DDR, a variety of new open interfaces and protocols are currently in the works: CXL, Gen-Z, OpenCAPI, CCIX. Among these, CXL is picking up momentum in AI/HPC data center applications, providing a sweet spot – in terms of capacity and density – for connecting high-capacity DRAM and SCM technologies such as 3D XPoint.

The “Status of the Memory Industry 2021” report will provide an overview of DIMMs, SSDs, and interfaces, marking the beginning of Yole’s program in the field of memory modules and storage drives.

Breakdown of DDR bit shipments by interface generation – historical (2015-2020) and forecast (2021-2026)



(Yole Développement, June 2021)

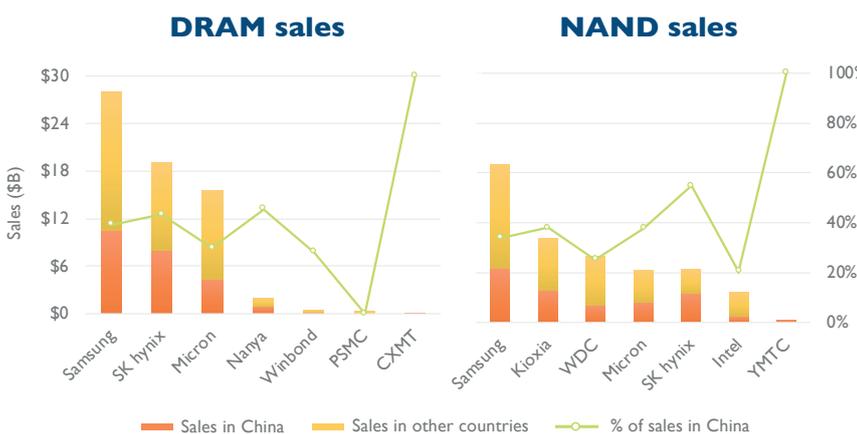
THE MEMORY BUSINESS IS NARROWING: CHINA HAS CHOSEN ITS TWO CHAMPIONS – YMTC AND CXMT – AND THE NAND MARKET KEEPS MOVING TOWARDS CONSOLIDATION

China is a key market for memory suppliers, accounting for more than 35% of the overall NAND and DRAM memory sales. In the last years, Chinese central and local governments – in partnership with private players – have been investing billions of dollars in developing a local memory industry and bridging the gap between domestic production

and consumption. While Chinese funding agencies have been supporting many semiconductor projects in the last few years, nowadays, they are more cautious and concentrate investments on the most reliable/promising technologies and players. The priority is clearly given to mainstream memories that are critical for the growing data center and mobile businesses. These are being developed by two key players: YMTC (NAND) and CXMT (DRAM). YMTC is currently shipping 64L NAND in low volumes domestically (including SSDs), with 128L production under development. CXMT is currently the leading DRAM maker in China, followed by Tsinghua Unigroup; broad commercialization is planned with Gen 3 products, while initial production will be limited and available only in the local market.

On October 20th, 2020, SK hynix announced the acquisition of Intel’s NAND manufacturing capacity in Dalian, its NAND-related IP, and its SSD business. This deal is beneficial to both parties and is not likely to have a major impact on the memory markets in the near term, as the two suppliers historically served different end markets – Intel focused on enterprise/data center; SK hynix focused on mobile and consumer segments. However, the longer-

Geographic breakdown (China vs. rest of the world) of DRAM and NAND sales for leading players



(Yole Développement, June 2021)

term impacts could be significant if this serves as the first step and motivator for subsequent consolidations that could alter the structure of the industry. With YMTC entering the market

in the coming quarter/years, broad industry consolidation may be the best path towards a healthier industry...

REPORT OBJECTIVES

Present an overview of the stand-alone memory market:

- NAND, DRAM, NOR, 3D XPoint, (NV)SRAM, and more
- Competitive landscape, activities, and strategies of key market players

Provide an understanding of stand-alone memory technologies and applications:

- Roadmaps with technology nodes, product development status, chip density, scaling challenges, and potential solutions
- Memory content evolution in key systems: servers, smartphones, PC, vehicles, and SSDs
- Main memory end-markets: data center, mobile, automotive, PC, and consumer electronics

Offer market forecasts for the stand-alone memory business:

- Market forecast (2020 - 2026) for NOR, (NV)SRAM, and other technologies, including emerging NVM
- Market forecast (2020 - 2026) for NAND and DRAM, with details on CAPEX by player, price per bit, market share, bit demand, bit shipments, wafer production, and more

Detail and analyze the competitive landscape:

- Financial analysis: key memory companies' revenue, CAPEX, R&D, operating costs, and margins
- Supply chain mapping from materials/equipment manufacturers to storage drive and memory module makers

COMPANIES CITED IN THE REPORT (non exhaustive list)

Adata, Alliance Memory, AP Memory, Apacer, Applied Materials, ASML, Avalanche, Canon, Centon, CXMT, Dialog Semiconductor, Dosilicon, Etron, ESMT, Everspin, Fujitsu, GigaDevice, GlobalFoundries, H-Grace, Hitachi, HLMC, IBM, IDT, Infineon-Cypress, Intel, ISSI, JHICC, Kingston, Kioxia, KLA Tencor, Lam Research, Lapis, Longsys, Liteon, Macronix, Marvell, Maxio, Maxim, MediaTek, Microchip, Micron, Montaga, Nanya, NEC, NetApp, NetList, Nuvoton-Panasonic, Phison, Powerchip, Powertech, Rambus, Realtek, Renesas, Samsung, Seagate, Silicon Motion, SK hynix, Smart Modular, SMIC, Sony, Spin Memory, STMicroelectronics, Swissbit, Texas Instruments, TEL, Transcend, TSMC, UMC, Viking, Violin Memory, Weebit, Western Digital, Winbond, XMC, YMTC, and many more.

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

Glossary and definitions	2	Memory modules and storage drives	236
Report objectives	11	> Memory modules	
Scope of the report	12	> Storage drives	
Three-page summary	22	> Persistent memory	
Executive summary	26	China's memory landscape	272
Memory market, drivers and dynamics	69	NAND – market forecast	299
> Data centers		DRAM – market forecast	308
> Mobile devices		Emerging NVM technology, forecast and players	317
> Automotive		Embedded memory business – overview	342
> PC and consumer electronics		Impact of Covid-19 pandemic on the memory market	356
Stand-alone memory market and technology	118	General conclusions	361
> NAND market and technology		Noteworthy news	365
> DRAM market and technology		How to use our data?	374
> NOR flash and other stand-alone memory		Yole Corporate presentation	375
Memory players and supply chain	186		
> Memory players – financial analysis			
> Supply chain mapping			
> Merger and acquisitions and new companies			

RELATED REPORTS, MONITORS & TRACKS



- DRAM Quarterly Market Monitor
- NAND Quarterly Market Monitor
- Emerging Non-Volatile Memory 2021
- Equipment and Materials for 3D-NAND Manufacturing 2020
- Micron LPDDR5 12GB Mobile Memory
- Intel Optane I28GB DIMM

More information and details about our offers and bundles opportunities on www.i-micronews.com



AUTHORS

Simone Bertolazzi, PhD is a Senior Technology & Market analyst at Yole Développement (Yole) working with the Semiconductor & Software division. He is member of the Yole's memory team and he contributes on a day-to-day basis to the analysis of memory technologies, their related materials and fabrication processes. Simone obtained a PhD in physics in 2015 from École Polytechnique Fédérale de Lausanne (Switzerland), where he developed novel flash memory cells based on heterostructures of two-dimensional materials and high-K dielectrics.



Walt Coon is VP of NAND & Memory Research is a member of the Semiconductor, Memory & Computing division, at Yole Développement (Yole). Based in the US, Walt is leading the day-to-day production of both market updates and Market Monitors, and is deeply involved in the business development of these activities. Prior to Yole, Walt spent 16 years at Micron Technology. Walt Coon earned a Master of Business Administration from Boise State University (Idaho, United-States) and a Bachelor of Science in Computer Science from the University of Utah (United-States).



Mike Howard is a member of the memory team at Yole Développement (Yole) as VP of DRAM & Memory Research. Mike is based in the US. Mike's mission at Yole is to deliver a comprehensive understanding of the entire memory and semiconductor landscape via market updates and Market Monitors. Mike is also deeply involved in the business development of these activities. Prior to Yole, Mike worked at IHS and Micron Technology. Mike earned a Master of Business Administration at The Ohio State University (United-States), a Bachelor of Science in Chemical Engineering and a Bachelor of Arts in Finance at the University of Washington (Washington, United-States).

CONTACT



Western US & Canada

Steve Laferriere - steve.laferriere@yole.fr
+1 310 600-8267

Eastern US & Canada

Chris Youman – chris.youman@yole.fr
+1 919 607 9839

Europe and RoW

Lizzie Levenez – lizzie.levenez@yole.fr
+49 15 123 544 182

Benelux, UK & Spain

Marine Wybraniez - marine.wybraniez@yole.fr
+49 69 96 21 76 78

India and RoA

Takashi Onozawa – takashi.onozawa@yole.fr
+81-80-4371-4887

Korea

Peter Ok - peter.ok@yole.fr
+82 1040890233

Japan

Miho Ohtake – miho.ohtake@yole.fr
+81 34405-9204

Toru Hosaka – toru.hosaka@yole.fr
+81 90 1775 3866

Japan and Singapore

Itsuyo Oshiba – itsuyo.oshiba@yole.fr
+81-80-3577-3042

Greater China

Mavis Wang – mavis.wang@yole.fr
+886 979336809 +86 136 61566824

Sales Coordination & Customers Service

David Jourdan – david.jourdan@yole.fr
+33 472 83 01 90

Fayçal El Khamassi – faycal.khamassi@yole.fr
+33 472 83 01 95

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. 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
- Design and characterization of innovative optical systems
- Financial services (due diligence, M&A)

More information on 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

REPORTS & MONITORS

- Market & technology reports
- Market and reverse technology quarterly monitors
- Structure, process and cost analysis and teardowns
- Cost simulation tool

More information on www.i-micronews.com/reports

CONTACTS

For more information about :

- Consulting & Financial Services: Jean-Christophe Eloy (eloy@yole.fr)
- Reports & Monitors: David Jourdan (david.jourdan@yole.fr) & Fayçal Khamassi (faycal.khamassi@yole.fr)
- Public Relations: Sandrine Leroy (sandrine.leroy@yole.fr)
- Marketing & Communication: Jean-Christophe Eloy (eloy@yole.fr)

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.