

STATUS OF THE MEMS INDUSTRY 2019

Market & Technology Report - June 2019

What does the future hold for the MEMS Industry?

WHAT'S NEW

- Updated market forecasts (in US\$ and units) for the period 2018 - 2024
- Up-to-date analysis of more than 160 different MEMS applications in seven different markets (consumer, automotive, telecom, medical, industrial, defense, aeronautics) and more than 15 different devices (inertial, microphones, pressure, etc.)
- 2018 estimates for sensor manufacturers' market share and evolution
- Latest industry news
- Current technology trends

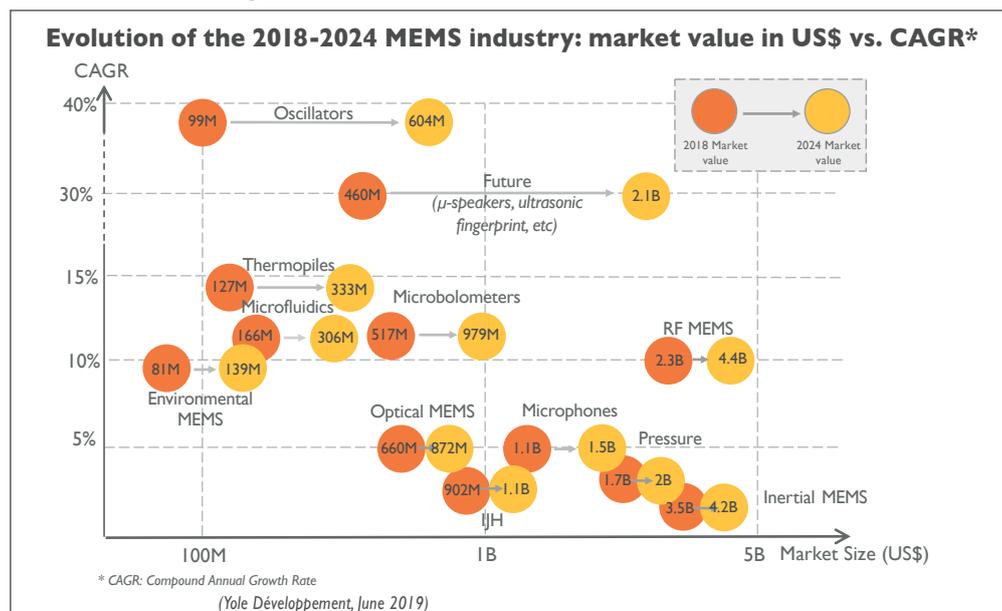
HOW IS THE MEMS MARKET HOLDING UP IN A GLOOMY ECONOMY?

The semiconductor market had its best year in 2018, reaching almost \$470B. However, growth was slower than anticipated due to sluggish smartphone and automotive sales. MEMS, which follows the semiconductor market, also had a good year, but with a slower growth rate than anticipated. However, Yole Développement (Yole) expects the MEMS market to experience significant growth from 2019 - 2024. Yole estimates the market will exhibit +8.3% growth in value and +11.9% growth in units, with consumer still having the biggest share (more than 60%). Some devices will benefit from new usage: for example, MEMS printheads for high-resolution printing, and microphones for more widespread adoption of voice interface. Also, regulation will favor pressure sensor growth due to the implementation of TPMS regulations in China. For inertial MEMS, automotive and consumer will continue to be a major part of the demand, focusing mostly on combos which provide better form factors and easier integration/higher functionality. Moreover, new applications are coming, such as medical (wearables) and industrial (machine health monitoring) for stand-alone inertial MEMS. Also, IMU growth will be driven by automotive (i.e. robotic vehicles). Future cars could integrate MEMS mirrors, which could find new usage in solid-state LIDAR, as

well as microbolometers for night vision capabilities and situational awareness in ADAS.

Yole believes smart buildings and retail will also be the impetus for infrared sensor market prosperity. On the medical side, Si continues to be adopted by microfluidics companies that develop CMOS-based biochips. Despite a slowdown in the smartphone market, 5G will drive the demand for new chips: this is the case for RF MEMS and MEMS oscillators, which will be needed in the deployments of new base stations and for the ever-growing edge computing.

In this 2019 Status of the MEMS Industry edition, Yole has revamped its RF MEMS forecast due to a delay in the adoption of the 8 x 8 MIMO. Despite this, Yole believes BAW filters will grow from \$2.3B to \$4.4B from 2019 - 2024. Last but not least, emerging MEMS like environmental MEMS, microspeakers, fingerprints, and auto-focus will fuel future market growth. This will be linked to new applications for more mature MEMS devices, such as key fob signal-blocking (accelerometer), gunshot localization (microphones), AI speakers, etc. Moreover, sensor fusion coupled with AI (and eventually edge computing) could stimulate new use-cases and rejuvenate the MEMS market.



GAME OF MEMS: BATTLE FOR THE THRONE

Competition is getting tougher and tougher between the different players, since the cake is not as big! On the M&A side, MEMS-related acquisitions declined during the last year, reflecting the weaker, general semiconductor-related M&As and a consolidation of the business. Furthermore, there were no significant

new entrants, and existing players struggled to compete against each other.

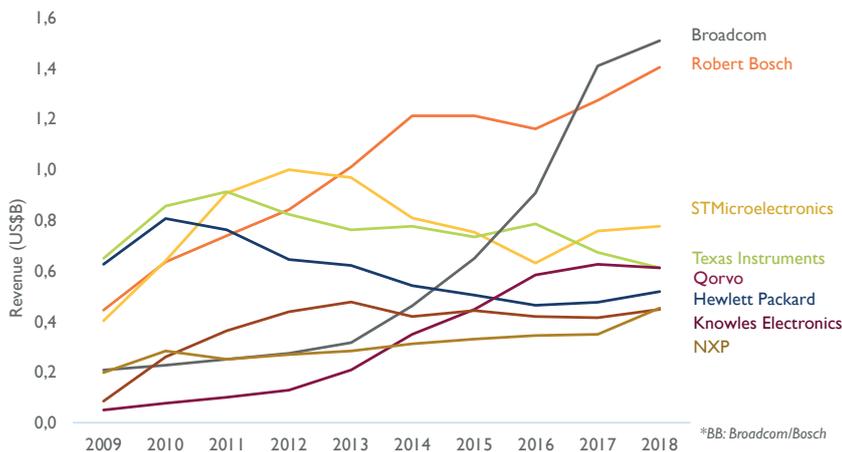
IDMs will continue producing in high volumes, while margins will keep dropping due to higher competition. For players, differentiation of products is paramount if they want to gain market share.

During 2018, every MEMS foundry grew: some by a little, others by a lot. However, not all MEMS device manufacturers saw their revenue grow. Competition is fierce for companies manufacturing the same devices:

- **Microphones:** Knowles and Goertek have left their competitors far behind, but Knowles seems to have hit a revenue wall. The company grew fast from 2009 - 2013 due to wide adoption of its MEMS microphones. But since then, its revenue seems to have fluctuated around \$450M. Even though Knowles might be strongly reliant on the smartphone market, the company has a diversified portfolio (i.e. with its "Ear" segment) to address other consumer applications as well. With the coming boom in the AI speaker market, and increasing microphone uses in automotive, Knowles and Goertek could profit further.
- **Inkjet heads:** HP and Canon are contesting for increased sales. While Canon declined, HP recorded slightly positive year-over-year growth due to increased demand for consumer printers and also because of strong adherence to its cartridge loyalty program.

- **Optical MEMS:** Texas Instruments is the uncontested leader for MEMS mirrors. However, if MEMS mirrors do not find new volume applications (in automotive, AR/VR, etc.), this market is likely to stay flat or having a modest growth. Also, there are still some niche markets where companies are doing quite well (i.e. 3D MEMS switches in optical telecom).
- **RF players:** in 2018, Broadcom still held top position in MEMS, while Qorvo experienced a small decline in revenue. But even while mobile phone shipments slowed during 2018, growth continues for the RF business in general, driven by an increasing number of filters in conjunction with the front-end module's increasing value. The introduction of 5G will further stimulate growth.
- **Inertial/pressure MEMS,** with players that experienced good growth individually but inevitably formed at least two battlegrounds:
 - NXP and Bosch competing in the automotive segment
 - Bosch and STMicroelectronics clashing in the consumer market

Different MEMS companies, different stories – The BB* effect

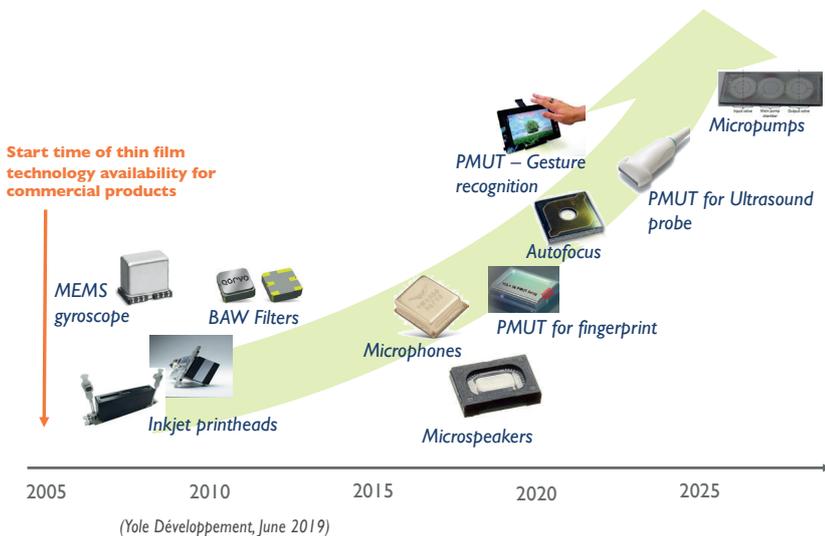


Finally, the « BB » effect is evident: Broadcom/Bosch with more than \$1B revenue stand apart from everyone else. Broadcom has benefited from exponential growth after 2013 - and from 2009 - 2014, Robert Bosch showed impressive growth too, going from \$400M MEMS revenue in 2009 to \$1.2B in 2014. In 2017, after two years of flat revenue, sales grew again, and then again in 2018. Bosch benefits from a manufacturing infrastructure that supports automotive and consumer markets, allowing manufacturing costs to be optimized.

Will the rapid growth of Broadcom continue in 2019, or will it be the year when Bosch retakes the throne?

FUTURE TECHNOLOGIES WILL ALSO OPEN NEW PERSPECTIVES

Piezo MEMS time to market: 2018-2025



MEMS are part of the More than Moore technologies. As such, they are not subject to a well-defined roadmap such as critical dimensions (CD) decrease, as for Moore's law. Also, most MEMS manufacturing technologies are mature (i.e. bulk, surface, cavity, packaging, thick SOI, WLP), while others have virtually disappeared (i.e. Xef2 etching). However, there are still new processes/materials in development for new functionalities (i.e. piezo MEMS) and reduced size (i.e. NEMS). Piezoelectric technology is increasing its momentum. Indeed, a revolution in MEMS technology is underway: piezoelectric MEMS. More and more gyroscopes, BAW filters, and inkjet heads are being created with this technology, and now microphones, microspeakers, autofocus, and PMUT (Piezoelectric Micromachined Ultrasonic Transducers) for fingerprint sensors, ultrasound, and gesture recognition, are underway too. Public/mainstream interest in this technology is also reflected by the increasing amount of funding in

companies related to piezo-MEMS, in a period where MEMS M&As and funding were otherwise low. Specifically, in 2018:

- Tikitin raised \$3.7M to support the launch of its MEMS piezoelectric resonator
- USound raised \$19.9M for its super-small smart speakers, courtesy of Austrian VC firm eQventure
- Vesper raised \$23M in series B funding, led by American Family Ventures, to scale microphone production. Vesper is also funded by Amazon, confirming the massive interest in integrating an ultra-low-power technology in smart speakers that are “always on”.

Furthermore, several MEMS foundries have already integrated a piezo process (PZT, AIN) in their fabs.

Will piezo technology be the one to rule them all in the future?

Another big trend is edge computing, with sensors and MEMS driving a new age of technology. Big data is an industry born of recent advancements in AI and machine learning, built upon and fueled by a wealth of new data from ever-expanding sensor applications. Sensors are digitizing the human experience, and as the real and virtual worlds move closer together, it will be sensors that bind them, enabling new experiences for users everywhere. Running AI at the edge, coupled with sensor fusion, will open new applications for MEMS in audio, motion, olfactometry, and imaging.



AUTHORS

Dimitrios Damianos, PhD joined Yole Développement as a Technology and Market Analyst and is working within the Photonics, Sensing & Display division. Dimitrios is daily working with his team to deliver valuable technology & market reports regarding the imaging industry including photonics & sensors. After his research on theoretical and experimental quantum optics and laser light generation, Dimitrios pursued a Ph.D. in optical and electrical characterization of dielectric materials on silicon with applications in photovoltaics and image sensors, as well as SOI for microelectronics at Grenoble's university (France). In addition, Dimitrios holds a MSc degree in Photonics from the University of Patras (Greece). He has also authored and co-authored several scientific papers in international peer-reviewed journals.



With almost 20 years of experience in MEMS, Sensors and Photonics applications, markets, and technology analyses, **Eric Mounier**, PhD provides deep industry insight into current and future trends. As a Fellow Analyst, Technology & Market, MEMS & Photonics, in the Photonics, Sensing & Display division, he is a daily contributor to the development of MEMS and Photonics activities at Yole Développement, with a large collection of market and technology reports as well as multiple custom consulting projects: business strategy, identification of investments or acquisition targets, due diligences (buy/sell side), market and technology analysis, cost modelling, technology scouting, etc. Previously, Eric Mounier held R&D and Marketing positions at CEA Leti (France). He has spoken in numerous international conferences and has authored or co-authored more than 100 papers. Eric has a Semiconductor Engineering Degree and a Ph.-D in Optoelectronics from the National Polytechnic Institute of Grenoble (France).

REPORT OBJECTIVES

- A global view of the future for MEMS, sensors, and actuators
- An understanding of the MEMS, sensor, and actuator markets and applications
- MEMS and sensor players' dynamics and ranking
- MEMS market data in \$M, units, and wafers for 2018 - 2024
- Information on future MEMS devices
- A presentation of MEMS game-changers and industry trends
- A MEMS applications overview: automotive, consumer, defense and aeronautics, medical, industrial, and telecommunications
- A MEMS financial analysis

COMPANIES CITED IN THE REPORT (non exhaustive list)

AAC Technologies, AKM, Alps Electric, Amphenol, ams, Analog Devices, Apple, Asia Pacific Microsystems, Boehringer Ingelheim Microparts, Bosch, Broadcom, Canon, Colibrys, Cirrus Logic, Denso, DRS Technologies, EPCOS, Epson, First Sensor Technology, FLIR Systems, FormFactor, Fujifilm Dimatix, Gettop, GlobalFoundries, Goertek, Hanking Electronics, Hewlett Packard, Honeywell, IMT, Infineon Technologies, Knowles Electronics, Maxim, Melexis, MEMSCAP, MEMSensing, MEMSIC, Micralyne, Murata, NXP, OMRON, ON Semiconductor, Panasonic, Qorvo, Qualcomm, Raytheon, ROHM Semiconductor, Samsung, Sensata, Sensirion, Si Time, Silex Microsystems, Silicon Sensing Systems, Sony, STMicroelectronics, TDK, TE Connectivity, Teledyne Dalsa, Texas Instruments, Tower Jazz, TSMC, Lynred (former ULIS), UMC, UTC Aerospace System, X-Fab and many more.

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

Executive summary	20	> Automotive
Context	37	> Medical
Market forecasts, trends, and players' market share	58	> Defense/aeronautics
> Inkjet heads		> Industry/telecommunications
> Pressure sensors		Wafer starts (units, revenue (by market, application, device)
> Microphones		157
> Inertials		Supply chain
> Optical		162
> Infrared		Focus on the Chinese market
> Si microfluidics		178
> RF & oscillators		Financial analysis
> Environmental		184
> Future		Technology trends
MEMS application analysis	145	Reverse Costing® – Structural, Process & Cost analyses
> Consumer		205
		Perspectives
		211
		About Yole Développement
		258

RELATED REPORTS

Benefit from our Bundle & Annual Subscription offers and access our analyses at the best available price and with great advantages



- Hardware and Software for AI 2018 – Consumer focus
- Uncooled Infrared Imagers and Detectors 2019
- Gas and Particle Sensors 2018
- Miniaturized Gas Sensor Comparison 2018 - Reverse Costing® – Structural, Process & Cost Report
- Piezoelectric Devices: From Bulk to Thin-Film 2019

Find all our reports on www.i-micronews.com

ORDER FORM

Status of the MEMS Industry 2019

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:

PAYMENT

BY CREDIT CARD

Visa Mastercard Amex

Name of the Card Holder:

Credit Card Number:

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

- Western US & Canada - Steve Laferriere:
+ 1 310 600-8267 – laferriere@yole.fr
- Eastern US & Canada - Chris Youman:
+1 919 607 9839 – chris.youman@yole.fr
- Europe & RoW - Lizzie Levenez:
+ 49 15 123 544 182 – levenez@yole.fr
- Japan & Rest of Asia - Takashi Onozawa:
+81-80-4371-4887 – onozawa@yole.fr
- Greater China - Mavis Wang:
+886 979 336 809 – wang@yole.fr
- Korea - Peter OK:
+82 10 4089 0233 – peter.ok@yole.fr
- Specific inquiries: +33 472 830 180 – info@yole.fr

⁽¹⁾ Our Terms and Conditions of Sale are available at
www.yole.fr/Terms_and_Conditions_of_Sale.aspx
The present document is valid 24 months after its publishing date:
June 26, 2019

PRODUCT ORDER - Ref YDI9031

Please enter my order for above named report:

One user license*: Euro 5,990

Multi user license: Euro 6,490

- The report will be ready for delivery from July 11, 2019
- For price 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⁽¹⁾

Signature:

*One user license means only one person at the company can use the report.

SHIPPING CONTACT

First Name:

Last Name:

Email:

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

MEDIA & EVENTS

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

More information on www.i-Micronews.com

REPORTS

- Market & technology reports
- Patent investigation and patent infringement risk analysis
- Structure, process and cost analysis
- 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: David Jourdan (jourdan@yole.fr) Yole Group of Companies
- Press Relations & Corporate Communication: 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.