

# STATUS OF THE MICROFLUIDICS INDUSTRY 2020

## Market & Technology Report - September 2020

*COVID-19 is boosting microfluidics' revenues as well as point-of-care technology adoption and will have a durable impact on the industry.*

### WHAT'S NEW

- Understand short- and long-term impact of the COVID-19 pandemic on the industry along with new related opportunities and who the main winners will be
- Learn more about eight application areas where things are hot currently
- Understand the competitive environment with detailed market shares per segment for the first time in this report
- Discover a detailed cost analysis regarding manufacturing line set-up and different types of microfluidic device/product manufacturing
- Benefit from a more detailed materials analysis this year, including glass and silicon wafer and raw polymer market sizes and forecasts
- Enter the world of microneedles with a dedicated chapter describing market and technology trends regarding this area
- Enjoy in-depth manufacturing process descriptions and comparison

### KEY FEATURES

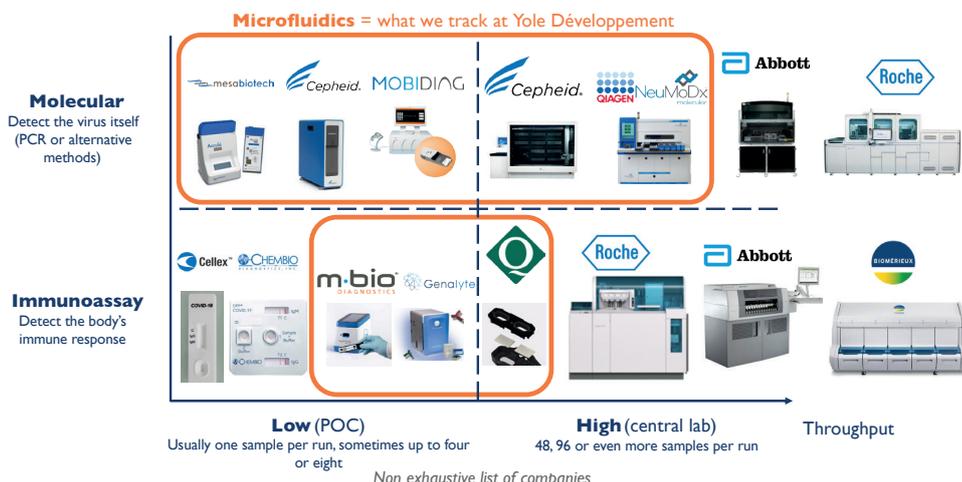
- COVID-19 impact
- Market segmentation, data and forecasts 2019-2025, by devices and products, in units and dollars, including material mix and wafer info
- Detailed explanation of current and future market trends, covering many applications of microfluidics
- Fundraising and M&A analysis help understanding the hot spots
- Market shares at different levels of the supply chain, including fabs and integrators, with comparison to last year, explaining the dynamics
- Materials, manufacturing and other technology trends, including alternatives to PCR, and roadmaps
- Cost analysis for microfluidic cartridge manufacturing and in-house vs outsourcing analysis
- Detailed description of every market segment including market and technology trends, and key players and product examples

### THE COVID-19 PANDEMIC HAS A STRONG SHORT-TERM IMPACT ON THE DIAGNOSTICS INDUSTRY AND WILL ALSO DURABLY RESHAPE IT

Following the advent of COVID-19 in early 2020, our society has encountered an unprecedented health and economic situation. Many countries around the world have had either partial or complete lockdowns for different durations. It's been more than six months and the situation is far from returning to normal, although life continues. In that context, and in order to understand the virus and control its spread, there is a continued strong demand for respiratory diagnostic tests. The world also needs research tools to study the virus' properties and mutations and help develop treatments or vaccines. This strong demand has pushed many diagnostics players to repurpose existing systems to detect the virus or associated antibodies. On the other hand their usual activity has been offset by lab closures and reluctance of patients to undergo their usual healthcare consultations. Microfluidic technologies have been used in various solutions. These include molecular diagnostics, immunoassays, rapid point-of-care tests and high-throughput solutions for centralized labs. There was an initial shortage of tests and it took time to develop appropriate solutions and to scale production lines. Numerous companies of all sizes including Abbott, Cepheid and bioMérieux have therefore had the opportunity to place many instruments at new customers' places because they were among the first to offer COVID-19 tests. They sold many of these

tests, resulting in a spike in revenues for Q1 and even more for Q2 2020. This dynamic seems on track for Q3, Q4 and at least to early 2021 as the pandemic continues. A second wave is starting to strike some countries, and healthcare organizations are now testing many more people than several months ago. However, this is not a one-shot rise in revenue that will come back to normal soon. Once the pandemic is over, these instruments will remain in place and be used for other tests that these companies offer. This will take their consumables sales to a higher level than before the pandemic. In this report, Yole Développement (Yole) explains COVID-19's impact on the microfluidics industry. The report reveals who the main winners will be and why. Analysts also describe how the situation opens up significant new opportunities in areas such as travel and workplaces – with rapid passenger or visitor screening – that represent billions of potential tests every year needed to help restart the world's economy. Moreover, governments and society have realized the importance of such diagnostic tests. They will surely support their continued development to be ready in case of another future pandemic. The diagnostics industry may therefore make the best of this bad situation and turn it in a real springboard. The pandemic could eventually push point-of-care testing to where it belongs, a true killer application of microfluidics.

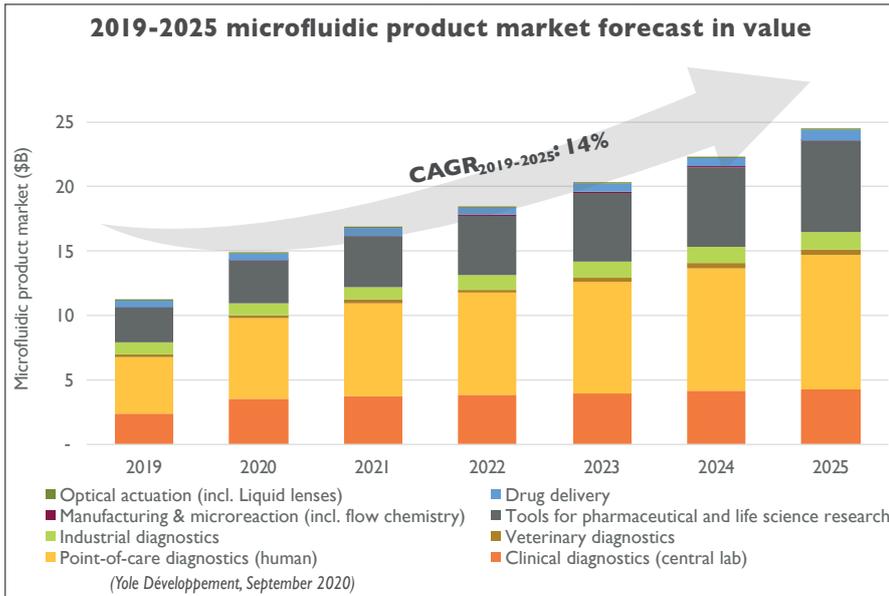
### Different types of COVID-19 tests for different purposes – All complementary



## THE MICROFLUIDICS INDUSTRY MATURES

Wherever we look, in most applications, we're in a period where volumes are ramping up rapidly. This is a sign of the technology and the business models maturing. The main hurdles are behind us. The sale of consumables is still the main model in microfluidics, however companies are finding more convenient solutions for their customers. For example, different companies are developing consumables for a common instrument so that customers only have to purchase a single instrument to run many types of test. Reagent rental options also diversify and take various forms, always to facilitate adoption. Indeed, successful

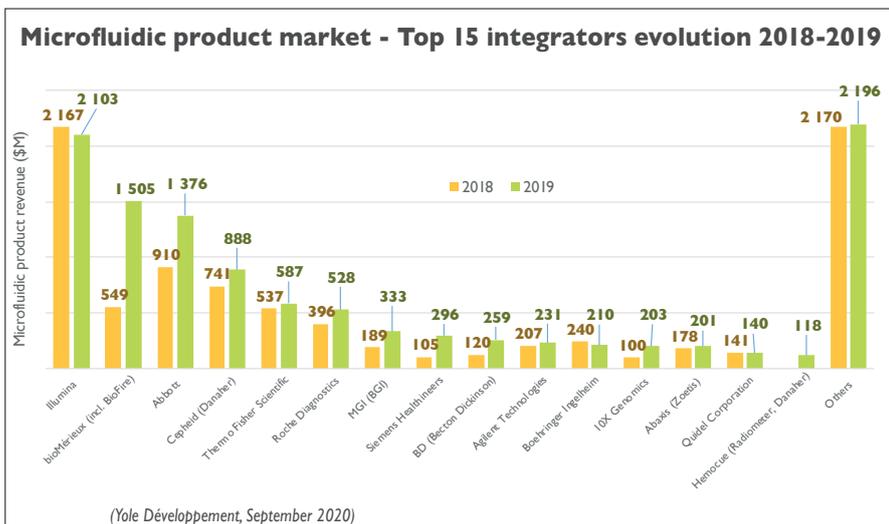
commercialization of microfluidic products and devices is improving, but still not easy. Besides point-of-care testing, the market is driven by tools for pharmaceutical and life science research. These include DNA sequencing, other genomics and proteomics tools, and much more. Veterinary testing is also enjoying very nice dynamics, with several significant new entrants. Moreover, new applications include liquid lenses, which enable miniaturized and enhanced optical actuation. These are now reaching commercialization and show tremendous potential for industrial and consumer applications. It confirms once again that microfluidic technologies are not limited to life sciences and healthcare. In this report, Yole's analysts present microfluidics' eight main hot areas. Furthermore, we detail how the microfluidic products market will grow from \$11.2B in 2019 at a Compound Annual Growth Rate (CAGR<sub>2019-2025</sub>) of 14% to reach \$24.5B by 2025. We describe the dynamics for each application. The report includes the market size for microfluidic device manufacturers and for the different materials – polymer, glass and silicon – used to manufacture microfluidic chips. Indeed, polymers are the most widely used material for manufacturing microfluidic devices, used in 92% of them, but only accounts for 34% of the market value. Glass and silicon devices, used in high-end applications, are much more expensive. In particular, silicon is increasingly used for on-chip sensing purposes and will take share in the coming years. Therefore, Yole provides an understanding of the opportunities in terms of glass and silicon wafers in the microfluidics field.



## DIAGNOSTICS GIANTS USUALLY DON'T OUTSOURCE THEIR PRODUCTION. CAN RECENT MICROFLUIDIC FAB ACQUISITIONS CHANGE THE SITUATION?

There are now thousands of microfluidic companies. Most of them use the services of specialized microfluidic device contract manufacturers, so-called "fabs", to manufacture the chips they need to implement their assays on. However, ten giant companies, including Illumina, bioMérieux, Abbott and Cepheid, hold almost 75% of the microfluidic product market. Most of these ten leaders manufacture their microfluidic devices – up to tens of millions per year each – in their own factories. Meanwhile, small and medium companies are struggling to make it to the next step. Most of them

remain well below million-unit volumes of each product annually. When a small company finally starts to grow, it gets acquired by giant companies that often bring manufacturing in-house. As a consequence, fabs don't have the chance to mass-produce microfluidic devices and have wondered how to attract blue-chip players for many years. The response could come from other industries, where large players recently shifted up a gear. Companies like Teledyne, Schott, and IDEX have done major fab acquisitions with Micralyne, MiniFAB and thinXXS. This brings all these fabs' know-how into the hands of major companies used to working with industry leaders. In the meantime, important players from the semiconductor industry like X-FAB proceed to make significant investments in microfluidics. More than ever, microfluidics represents a tremendous potential for classic semiconductor players. They see a significant growth opportunity in the medical market. But are these investments enough to shift life science and diagnostics giants' manufacturing strategies? It is certainly worth a try, but more investment is needed. In this report, Yole's analysts provide market shares of integrators on eight segments of the microfluidics market. The report also includes market shares of microfluidic fabs, giving readers a comprehensive understanding of the competitive environment within this industry. An analysis of recent industry moves, including fundraising and mergers and acquisitions (M&A), is also discussed.



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

10X Genomics, Abaxis (Zoetis), Abbott, Affymetrix (Thermo Fisher), Agilent Technologies, binx health, Axxicon, Balda AG (Stevanato Group), BD, Berkeley Lights, BGI, Biocartis, BioFire Diagnostics (bioMérieux), bioMérieux, Bionano Genomics, Bio-Rad, BioSurfit, Boehringer Ingelheim, Bosch Vivalytic, PerkinElmer, CapitalBio, Cellenion (Sciencion, CELLINK), Cepheid (Danaher), Charles River, Corning, Cue Health, Curetis (OpGen), Curiosity Diagnostics (Scope Fluidics), Cytena (CELLINK), Denz Bio-Medical, DiaSorin Molecular, DNA electronics (DNAe), DNA Nudge, Elveflow (Elvesys), ENPLAS, EVG (EV Group), Fluidigm, Fluigent, Fluxergy, Formulatrix (Qiagen), Genalyte, GenapSys, GeneDisc (Pall Corporation), GenePOC (Meridian Bioscience), GenMark Diagnostics, Gyros Protein Technologies (Mesa Labs), HemoCue (Radiometer, Danaher), Hicom, Hochuen, IBM, Illumina, imec, IMT AG, IMT MEMS, InSilixa, Intel, Invenios (Corning), Kloé, LabCyte (Beckman Coulter, Danaher), LexaGene, LioniX, Little Things Factory (Plan Optik), L'Oréal, Luminex Corporation, LumiraDx, MBio Diagnostics, MedSpray, Mesa Biotech, MGI (BGI), Micralyne (Teledyne), Microfluidic ChipShop, MicroLiquid, Micronit, Minicare (Siemens), MiniFAB (Schott), Mobidiag, Nabsys, Nanomedical Diagnostics (Cardea), NanoString Technologies, NeuMoDx (Qiagen), Nypro (Jabil), Omniome, Oxford Nanopore Technologies, Pacific Biosciences, Philips Innovation Services, Qiagen, Qorvo Biotechnologies, Quanterix, QuantuMDx, Quidel Corporation, Rheonix, Roche, Rogue Valley Microdevices, Roswell Biotechnologies, Samsung, Sanwa Biotech, Sartorius, Schott and more...

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**RELATED REPORTS, MONITORS & TRACKS**

- Point-of-Need 2020 – Including PCR-Based Testing
- Status of the MEMS Industry 2020
- BioMEMS Market and Technology 2020
- Organs-On-Chips Market and Technology Landscape 2019
- Next Generation Sequencing & DNA Synthesis: Technology, Consumables Manufacturing and Market Trends 2019

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**REPORT OBJECTIVES**

- Analysis of COVID-19 short- and long-term impact on applications, players, and new opportunities
- New major trends and evolution in the microfluidic industry markets, applications, and business models
- Presentation of the hot spots where things are moving, along with future high-potential applications
- Analysis of strategic moves since 2019 including mergers and acquisitions and fundraising
- Understanding of the competitive environment with an overview of key players and products per segment, and evolution of microfluidic integrators' market shares per segment, and of foundries' market shares
- Updated market data and forecast up to 2025, in value and units for microfluidic devices and products, with insights about the materials market including polymer, glass wafers and silicon wafers
- Supply chain description and analysis
- Cost analysis for the manufacturing of microfluidic devices with different materials and processes, and for the establishment of a manufacturing line
- Latest technology trends including materials, manufacturing, biology, detection methods and multi-modal platforms

**AUTHOR**

**Sébastien Clerc** is a Technology & Market Analyst in Microfluidics, Sensing & Actuating at Yole Développement (Yole). As part of the Photonics & Sensing team, Sébastien has authored a collection of market and technology reports dedicated to microfluidics and other micro-devices for both market segments: medical including diagnostics, pharmaceutical, biotechnology, drug delivery, medical devices, and industrial including environment, agro-food. At the same time, he is involved in custom projects such as strategic marketing, technology scouting and technology evaluation to help academic and industrial players in their innovation processes. Thanks to his technology and market expertise, Sébastien has spoken at more than 20 industry conferences worldwide over the last four years. Sébastien Clerc graduated from Grenoble Institute of Technology, Grenoble INP, in Grenoble, France, with a Master's degree in Biomedical Technologies. He then completed his academic studies with a Master's degree in Innovation and Technology Management at the same institute.

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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. 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.

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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 .

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- 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.