

# Competitive Technology Report

Company: Amazon.com, Inc.

Date: January 2022

With this report, Quant IP assesses the competitive position of a company from a technological perspective.

Using forward looking patent data and Machine Learning, Quant IP uncovers strengths and weaknesses in the current technology portfolio, identifies all relevant technological competitors and benchmarks the company's technology portfolio accordingly.

Quant IP also identifies the technology trends with the most potential for disruption and quantifies the company's capabilities to manage them.

This CTR has been produced by Quant IP. All content is subject to license agreements.

## Introduction

### Quant IP Patent Rating

**Quant IP Patent Rating** takes a purely quantitative approach and is based on proprietary algorithms to predict patent success in three critical areas. It is based on benchmarking inventions relative to similar ones and thus makes it possible to compare the quality of patents in all technical fields.

**Quant IP Patent Rating** is based on three Quality Scores defined as:

**Grant Robustness:** The average probability for a patent to be granted in 4 major jurisdictions (USA, EU, China, Japan), evaluated at the time of publication of the patent application.

**Market Potential:** The predicted number of markets the rights for the innovation is secured within 5 years after priority date.

**Citation Potential:** The predicted number of forward citations an invention receives 5 years after filing.

**Quant IP Quality Score** is an aggregated score of the three scores above. Quant IP Quality Score is translated into Quant IP Patent Rating.

**Quant IP Patent Rating** percentiles based on the Quant IP Quality Scores for similar patents are defined as follows:

**AAA** – Top 10%, **AA** – Top 30%, **A** – Top 50%, **B** – Bottom 50%  
Similar patents are determined using IPC classification codes, a standard developed by the European Patent Office to classify and categorize patent documents



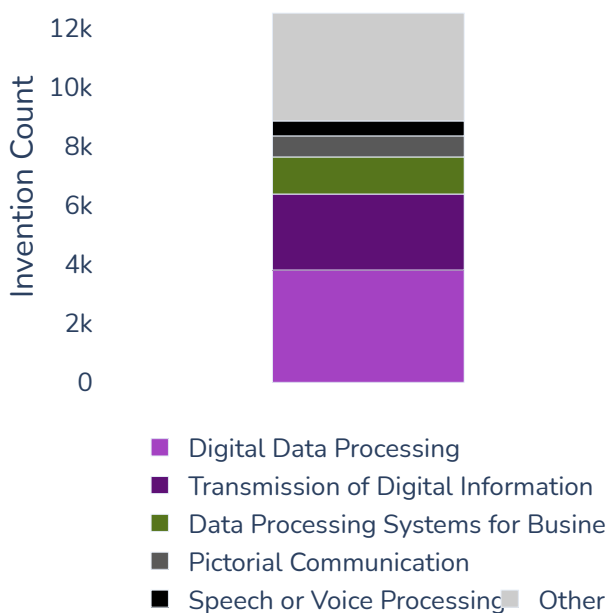
## Executive Summary

Amazon.com, Inc. ranks 2 in the Competitive Technology Benchmarking, scoring very well in terms of its patent portfolio size and quality, leading to a very good positioning in terms of technology competitiveness. Higher growth rates in terms of patent filings would push the company to the very top of the ranking.

Amazon.com, Inc. is most active in the technological fields Digital Data Processing, Transmission of Digital Information, and Data Processing Systems for Business. The company's patent portfolio average quality rating is AA. That means, on average, Amazon.com, Inc.'s patents are better than 84.6 percent of comparable patents from competitors.

The most important technological fields for the company and its peer group are Controlling Non-Electric Variables, Radio Navigation and Traffic Control Systems. A technology disruption index of 100 indicates that Amazon.com, Inc. is very well suited to withstand disruptive technology forces. The company is likely to disrupt rather than be disrupted in the near future.

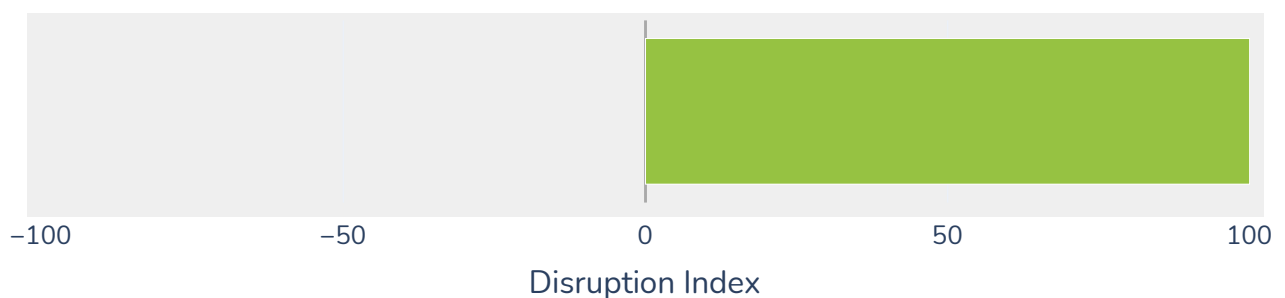
### Technological Footprint



### Average Patent Quality



### Technology Disruption Index





- 1- Technology Portfolio Evaluation
- 2- Competitive Technology Benchmarking
- 3- Technology Disruption Index

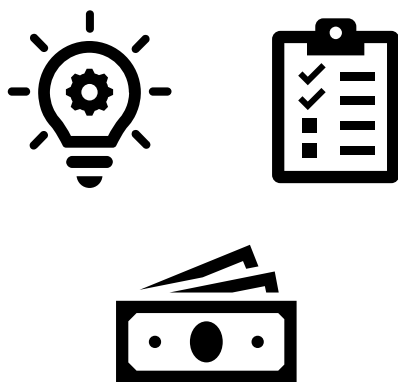
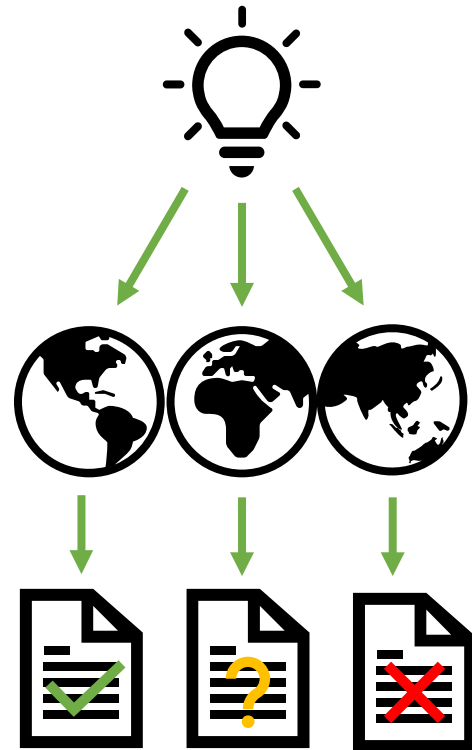
# Technology Portfolio Evaluation

Patent Processes in a Nutshell: Introduction  
Patent Portfolio Quality  
Patent Activity and Quality Over Time

## Patent Processes in a Nutshell: Introduction

The intellectual property domain can be complicated for professionals not involved in it at a daily basis. Here is a basic summary to explain the terms and include all you might need to know to understand this report.

- When a new discovery is made you can apply for a patent. This discovery is called **an invention**.
  - Each incremental discovery is an invention on its own. It is often the case that a product consists of many inventions.
- You need to file for a patent in each country separately and creating **many patent filings** for **one invention**.
  - Each application comes with its own filing costs, results and upkeep costs, making it a strategic decision to internationalize.



- These patent documents are all linked to one invention. They are also called a **patent family** of an invention.
- Patent filings that are not yet granted are referred to as pending or as a **patent application**.
- If the patent offices grant the right, the patent becomes a **granted** or **active patent** until it expires.

## Patent Portfolio

Number of inventions (last 20 years)

13,142

Number of active / pending patents

16,269 / 1,871

Annualized invention growth rate (last 12 months)

13.3%

Annualized invention growth rate (last 3 years)

17.9%

## Patent Portfolio Quality

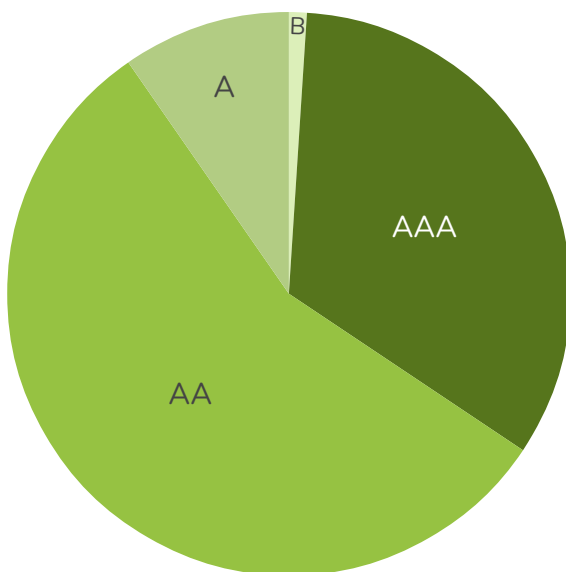
### Average Patent Rating



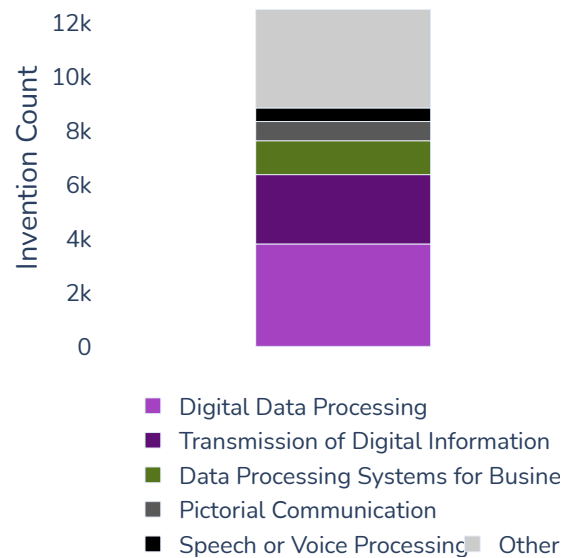
Combining expert domain knowledge with machine learning, Quant IP created **Quant IP Patent Rating**, the first indicator built on predictions of future patent success and therefore applicable from the first day of publication (see appendix).

Quant IP Patent Rating combines various indicators into one quality assessment quantifying the quality of a company's patents and the whole portfolio.

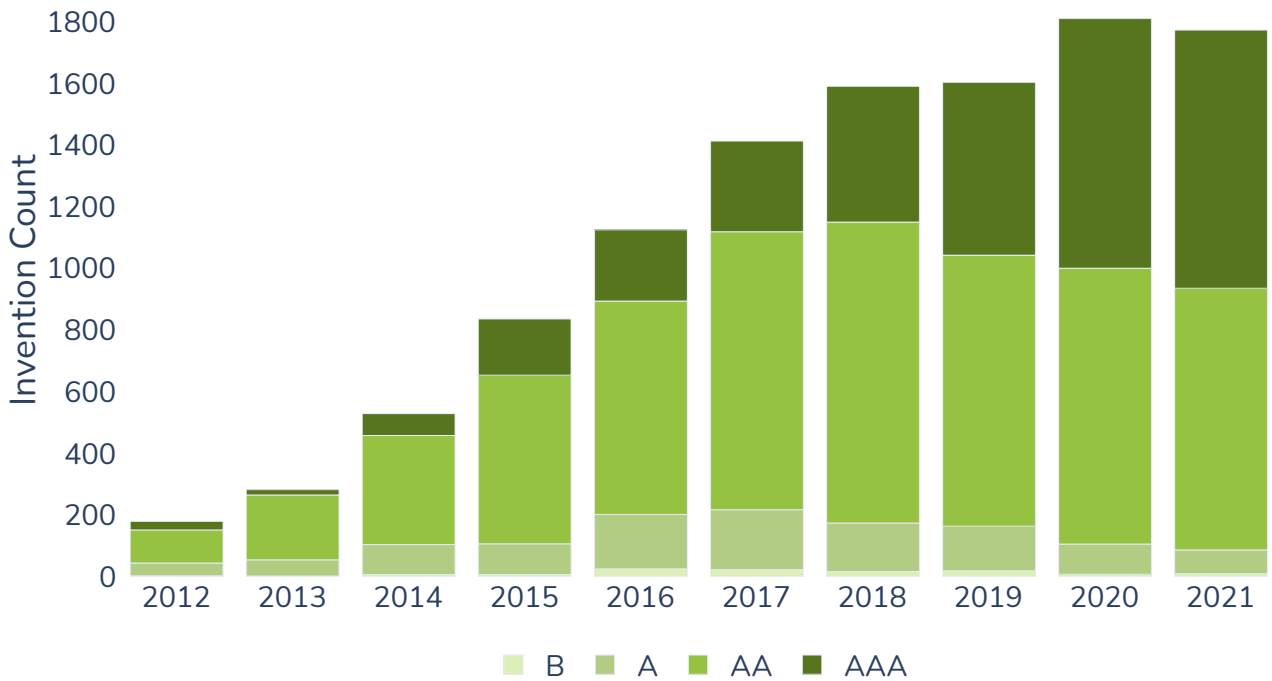
### Patent Rating Distribution



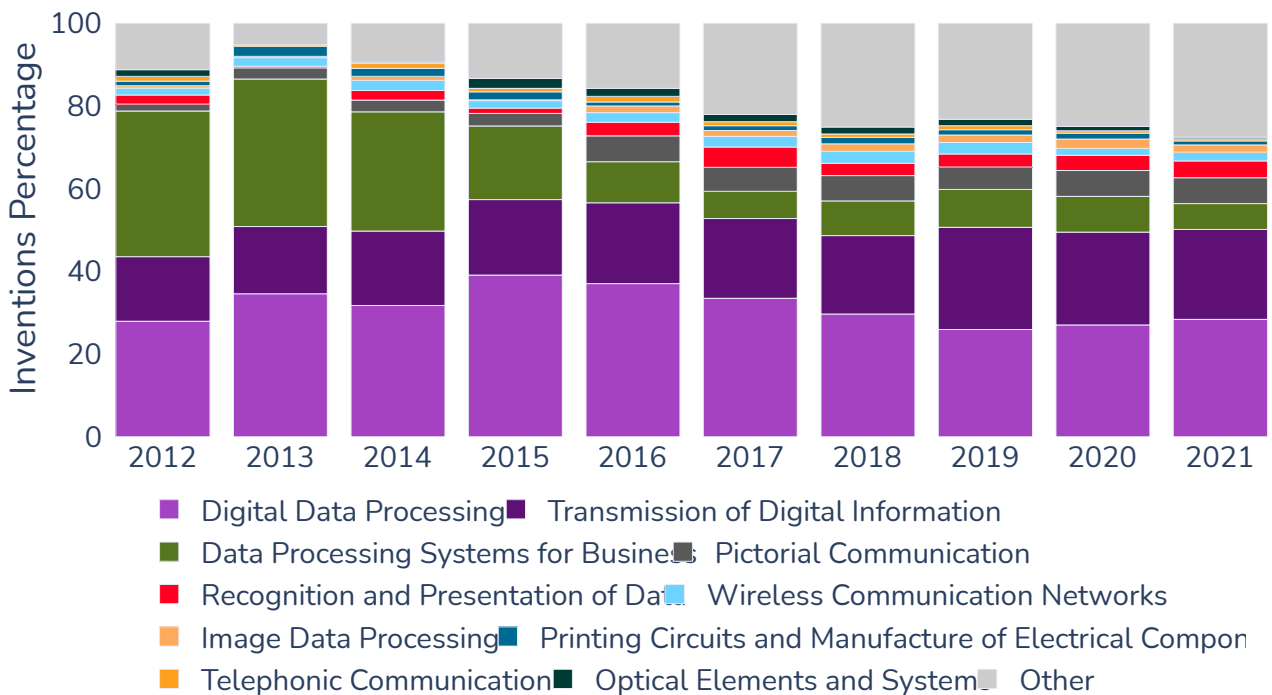
### Technological Footprint (10y)



## Patent Activity and Quality Over Time



## Technology Footprint Over Time



- 1- Technology Portfolio Evaluation
- 2- **Competitive Technology Benchmarking**
- 3- Technology Disruption Index

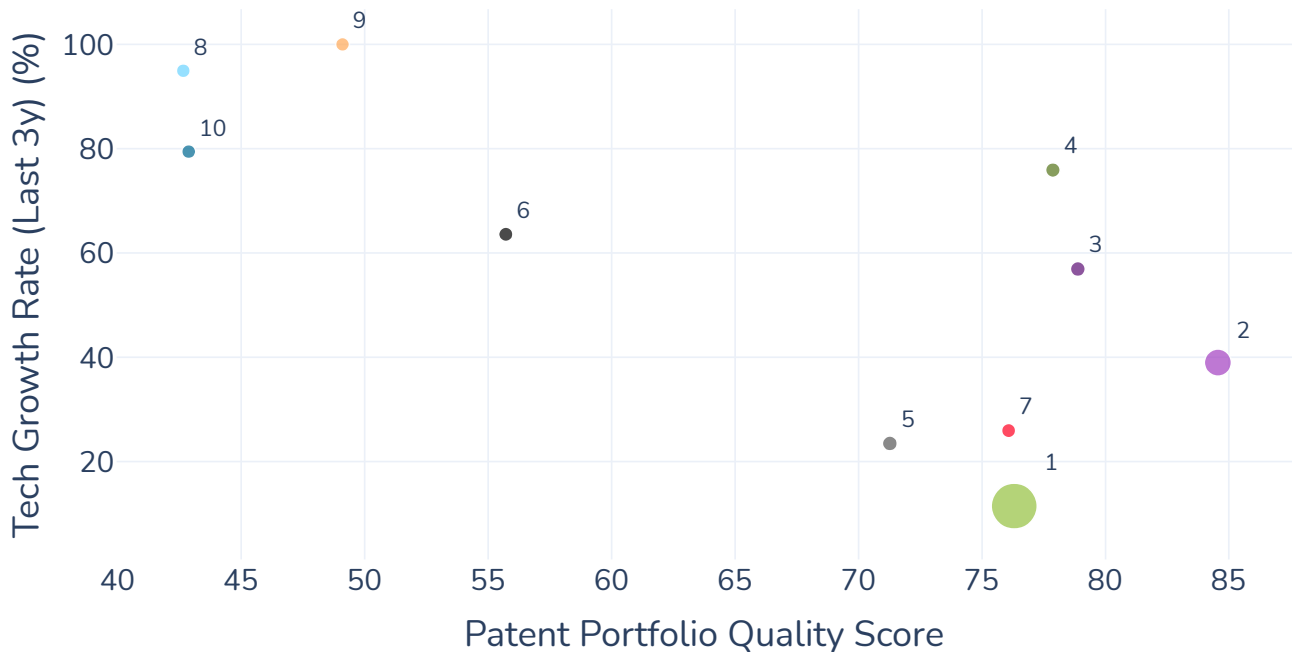
# Competitive Technology Benchmarking

Technological Peer Group Overview  
Competitive Benchmarking Results



## Technological Peer Group Overview

The graph below maps how Amazon.com, Inc. is positioned among its peer group based on Patent Portfolio Quality and the Tech Growth Rate. The bubble size correlates to number of inventions of the company. See appendix for specific definitions of Patent Portfolio Quality Score and Tech Growth Rate.



- 1 - Microsoft Corporation
- **2 - Amazon.com, Inc.**
- 3 - College Parent LP
- 4 - ServiceNow, Inc.
- 5 - Atos SE
- 6 - Kingsoft Corporation Limited
- 7 - Open Text Corporation
- 8 - Inspur Group Limited
- 9 - Beijing Wondersoft Technology Co., Ltd.
- 10 - Hangzhou DT Dream Technology Co., Ltd.

## Competitive Benchmarking Results

Company	Size (3y)	Absolute Growth (3y)	Relative Growth (% , 3y)	Quality Score	Competitive Rank
Microsoft Corporation	45876	5418	11.5	76	<b>1</b>
->> Amazon.com, Inc. <<-	13142	5128	39.0	85	<b>2</b>
College Parent LP	923	551	56.9	79	<b>3</b>
ServiceNow, Inc.	689	523	75.9	78	<b>4</b>
Atos SE	954	265	23.5	71	<b>5</b>
Kingsoft Corporation Limited	541	344	63.6	56	<b>6</b>
Open Text Corporation	432	117	25.9	76	<b>7</b>
Inspur Group Limited	297	282	94.9	43	<b>8</b>
Beijing Wondersoft Technology Co., Ltd.	190	190	100.0	49	<b>9</b>
Hangzhou DT Dream Technology Co., Ltd.	282	224	79.4	43	<b>10</b>
MicroStrategy Incorporated	230	94	40.2	77	<b>11</b>
China Power World Wide Information Technology Co., Ltd.	105	105	100.0	48	<b>12</b>
G-Cloud Technology Corp	724	129	17.8	40	<b>13</b>
China Telecom Group Co., Ltd.	335	100	29.9	44	<b>14</b>
Yahoo Holdings Inc	214	77	36.0	78	<b>15</b>
Workday, Inc.	150	86	57.3	78	<b>16</b>
Zhongfu Information Inc.	104	96	92.3	54	<b>17</b>
Open Invention Network LLC	341	60	17.6	76	<b>18</b>
Sohu.com Limited	239	74	31.0	50	<b>19</b>
The Charles Schwab Corporation	126	45	34.1	75	<b>20</b>

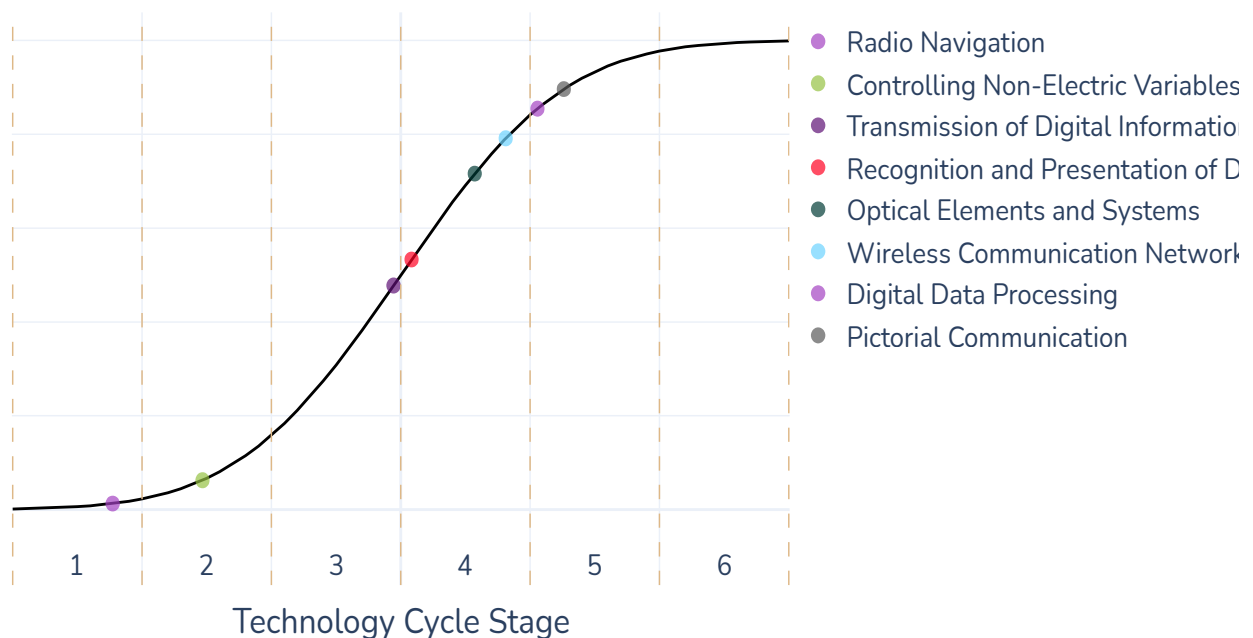
- 1- Technology Portfolio Evaluation
- 2- Competitive Technology Benchmarking
- 3- Technology Disruption Index**

# Technology Disruption Index

Technology Field Identification  
Technology Life Cycle Analysis  
Technology Disruption Index

## Technology Life Cycle Analysis

The Technology Life Cycle mirrors the Technology Adoption S-Curves from a patent filing perspective with a lead time. Technologies in the earlier stages are novelties that might take a long time before showing significant returns on investments from their patent filing move to a sweet spot where most of the most important inventions in a cycle happen. After stages of decelerating growth the cycle closes when all relevant inventions are filed for. A new cycle within one technology field starts when new breakthrough technologies offer new market opportunities.



- Stage 1** In this stage, few companies file for patents and filing growth is still low. Applications for new inventions are still far from certain and the risks of R&D investments are very high. At the same time rewards for companies able to file for key inventions are extremely high.
- Stage 2** In this stage, competitors accelerate their filing activity and new competitors feel confident to join as applications for new inventions become more obvious and the risks of R&D investments decrease. For companies with enough confidence in marketable solutions this is the sweet spot for ramping up filing activity as many key patents are filed at this stage.
- Stage 3** Here filing growth rates accelerate significantly and are very likely to stay high for some months or even years. At this stage it is the last chance to gain a significant share technology field for new entries as product launches start and the full potential of the market becomes apparent.
- Stage 4** While companies coming late still enter the field, filing growth rates are peaking. Almost all important applications are known and product launches become more common.
- Stage 5** Here filing growth rates are slowing down considerably and some competitors leave the field because they cannot compete for the most prominent spots in the technology market. In the application market, first signs of consolidation appear as well.
- Stage 6** Almost all companies slowed down filing activity as the new technology has been filed for in every aspect. New technical approaches are needed to start a new cycle. Consolidation in the market for applications starts to accelerate even as revenues overall are still growing.

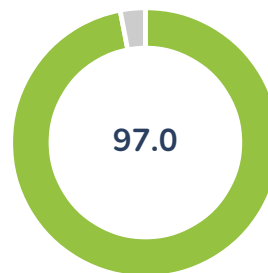
## Technology Impact Analysis

The **Impact Ratio** quantifies the importance of a technology for a company. A high ratio indicates that the technology is relevant to a lot of other technology fields relevant to the company. Technologies with high impact scores are more likely to be or become general purpose technologies.

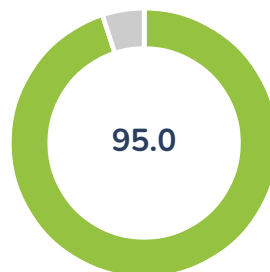
**Controlling Non-Electric Variables**



**Radio Navigation**



**Traffic Control Systems**



## Technology Field Identification

The Technology Disruption Index is an objective assessment of the company’s ability to withstand or actively manage disruptive technology trends. The first step is to identifying the tech fields that grow the fastest in both relative and absolute terms.

The graph below shows the trending fields relevant to the peer group. The graph highlights the importance of the technology field with the Impact Index and the expected future growth in the field over the next 12 months.



The **Impact Ratio** (y-axis), quantifies the importance of a technology for a company. A high ratio indicates that the technology is relevant to a lot of other technology fields relevant to the company. Technologies with high impact scores are more likely to be or become general purpose technologies.

The **Projected Growth** (x-axis) quantifies the future growth that can be expected based on the stage in the life cycle of that technology.

The **Size** (bubble-size) reflects the number of filings and thus the investments in that fields as of now.

## Technology Trend Analysis

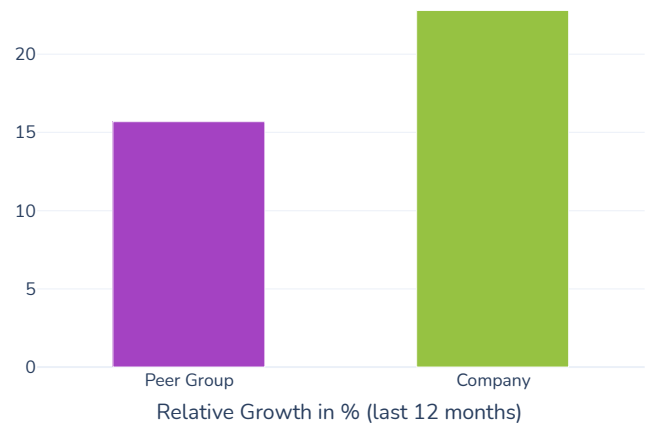
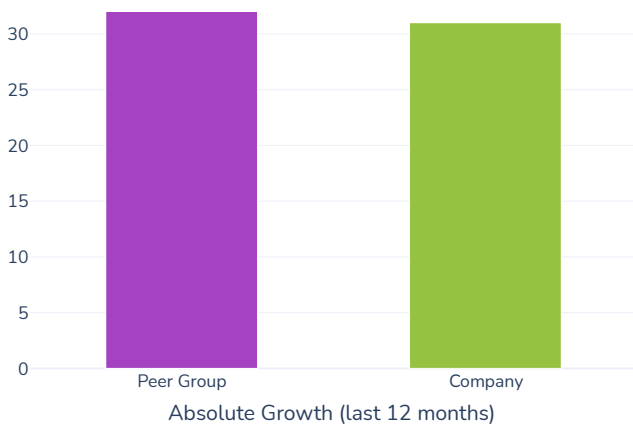
The table below provides the overview on important technology fields for the peer group of Amazon.com, Inc. Size and Growth metrics are based on invention counts. It is important to note that all metrics take into account patents that are relevant to the target company.

Technology Field	Absolute Growth (1y)	Relative Growth (% 1y)	Impact	Disruptive Rank
Controlling Non-Electric Variables	32	15.7	100	<b>1</b>
Radio Navigation	32	8.1	97	<b>2</b>
Traffic Control Systems	26	17.9	95	<b>3</b>
Optical Elements and Systems	33	4.3	91	<b>4</b>
Pictorial Communication	183	4.5	79	<b>5</b>
Wireless Communication Networks	81	5.5	76	<b>6</b>
Recognition and Presentation of Data	182	9.4	73	<b>7</b>
Digital Data Processing	1774	5.2	60	<b>8</b>
Computer Systems	226	15.8	59	<b>9</b>
Transmission of Digital Information	878	6.6	57	<b>10</b>
Printing Circuits and Manufacture of Electrical Components	27	5.5	98	<b>11</b>
Circuit Arrangements for Electric Energy Distribution	19	10.3	96	<b>12</b>
Semiconductors and Solid State Devices	29	10.5	94	<b>13</b>
Speakers and Microphones	26	12.0	85	<b>14</b>
Speech or Voice Processing	120	7.9	65	<b>15</b>
Data Processing Systems for Business	283	3.9	58	<b>16</b>
Image Data Processing	102	5.3	63	<b>17</b>
Signalling Systems	12	10.4	84	<b>18</b>
Electric Transmission	20	9.8	82	<b>19</b>
Diagnosis & Identification	2	2.0	92	<b>20</b>

The 3 highlighted above are the fields with the highest growth and the earliest in their respective tech life cycles. They are therefore selected for further analysis for impact. In the following pages, each field is examined in more detail.

## Technology Field Benchmarking: Controlling Non-Electric Variables

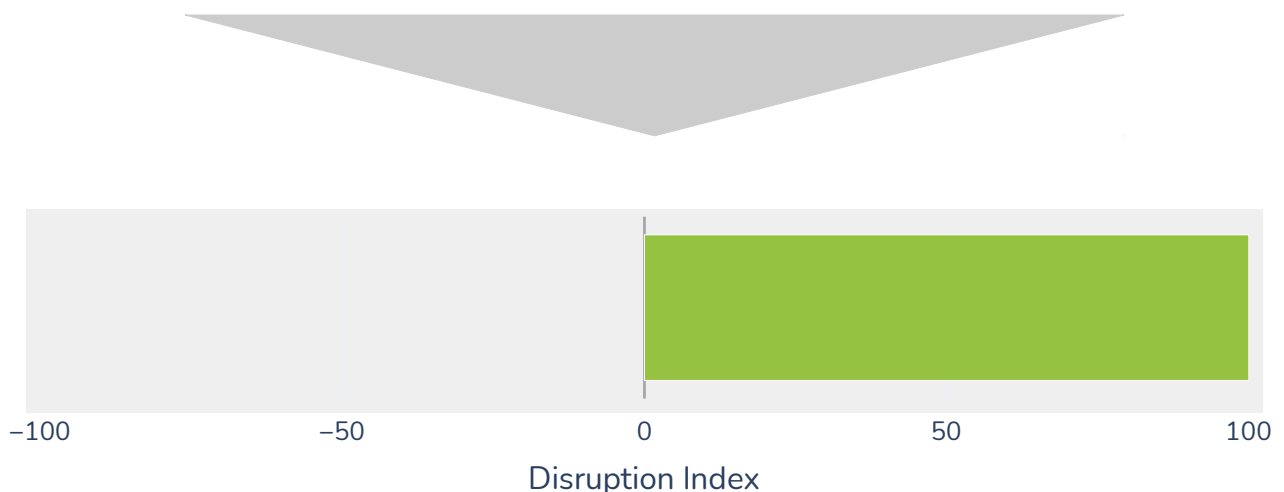
The most common keywords among patents relevant to this technology field are: **autonomous vehicle, drive unit, mobile drive unit**



### Size:

**136**  
Inventions in the last 20 years  
(85.5% of the patents in this field  
among the peer group)

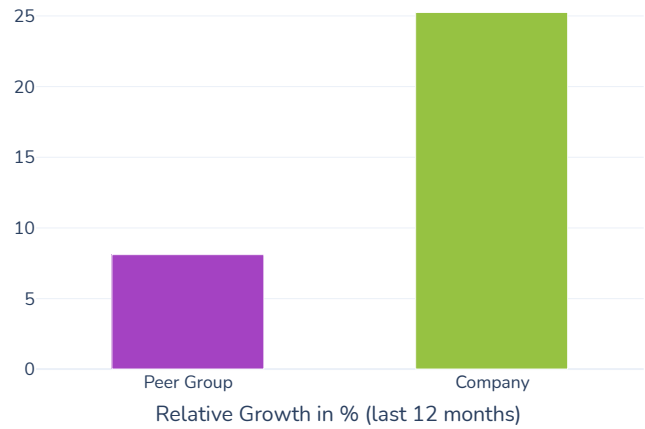
### Quality:





# Technology Field Benchmarking: Radio Navigation

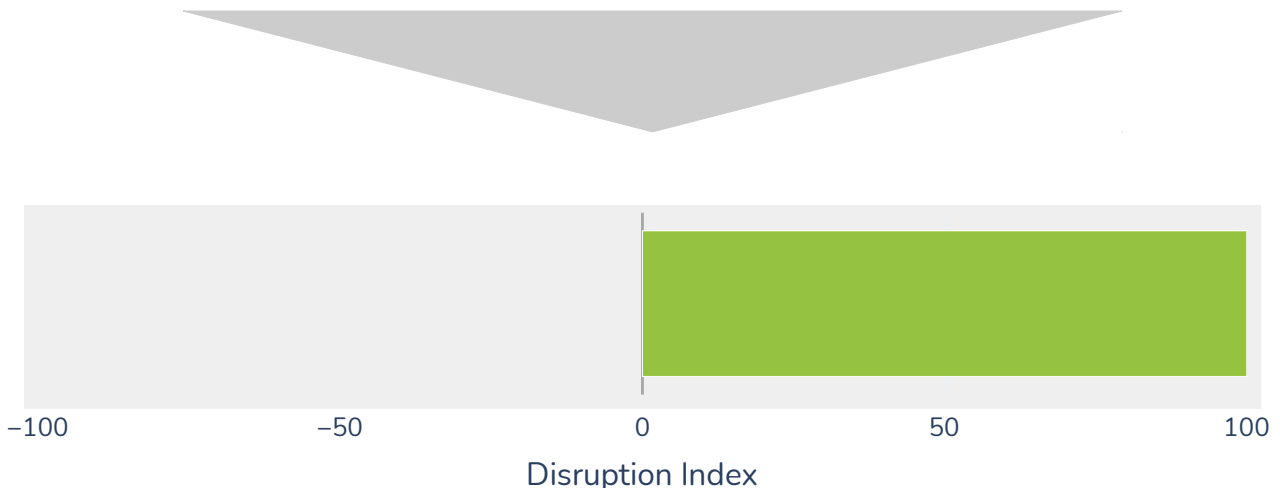
The most common keywords among patents relevant to this technology field are: **flight camera, location determination, depth imaging**



## Size:

99  
Inventions in the last 20 years  
(29.9% of the patents in this field  
among the peer group)

## Quality:



## Technology Field Benchmarking: Traffic Control Systems

The most common keywords among patents relevant to this technology field are: **aerial vehicle, unmanned aerial vehicle, autonomous vehicle**

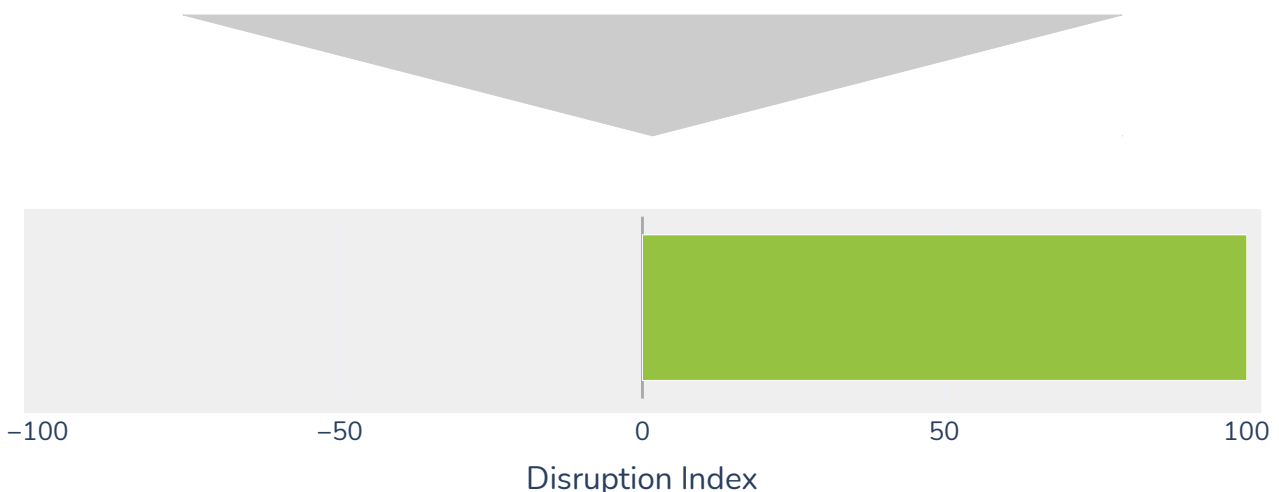


### Size:

70

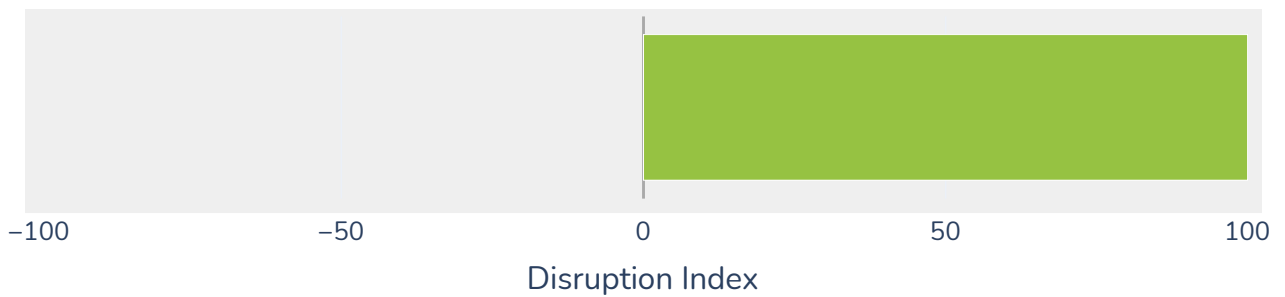
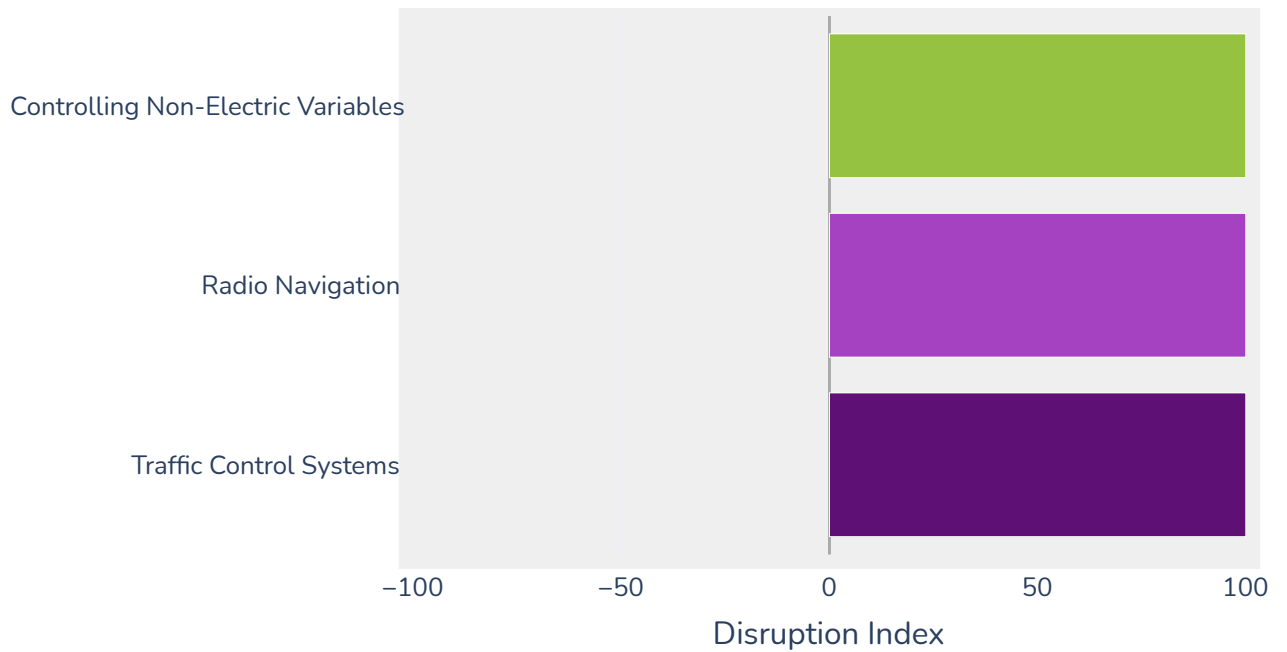
Inventions in the last 20 years  
(48.6% of the patents in this field  
among the peer group)

### Quality:



## Technology Disruption Index

A technology disruption index of 100 indicates that Amazon.com, Inc. is very well suited to withstand disruptive technology forces. The company is likely to disrupt rather than be disrupted in the near future.



## Appendix

### Glossary

**Invention** - New product, process or apparatus or any new use thereof. To be patentable, an invention must be novel, involve an inventive step and be susceptible of industrial application.

**Patent Application** - Request for patent protection for an invention filed with a patent office. Aimed at legal protection for the invention in the patent offices' jurisdiction.

**Pending Patent** - Patent application that is filed and in process to receive a grant from the patent office.

**Granted Patent** - Patent application that is filed and has received a grant from the patent office.

**Active Patent** - Granted patent that is not expired or otherwise discontinued.

**Patent Family** - Set of interrelated patent applications filed in one or more countries to protect the same or a similar invention by a common inventor and linked by a common priority.

**Priority** - A priority is a right to file applications for the same invention at other offices within 12 months of the first application and yet claim the filing date of the first application.

**Priority Date** – Filing date of the earliest patent application of an invention.

**Filing Date** - The date when a patent application is first filed at a patent office.

**Publication Date** - The date on which a patent document is published. Most patents are published 18 months after filing.

**Publication Number** - The publication number is the number assigned to a patent application on publication.

**Applicant** - A person or an organization that has filed a patent application. There may be more than one applicant per application.

**IPC** – International Patent Classification, currently divides all technologies into approximately 70 000 areas.

**Citations** - A list of references containing cited and citing documents. As in academia, citations are used as an indicator for the quality of the invention.

**Cited Document** - Documents that are cited by a specific patent document by a patent authority or by the applicant. Also known as backward citations.

**Citing Documents** - Patent documents that cite a specific patent. Also known as forward citations.

**Technology Field** – A subset of IPC classifications or a number of patents which define a specific technology.

**Technology Life Cycle** – The time period in between two minima of patent filing activity related to a specific technology. A global maximum is present within the life cycle. Quant IP defines 6 phases within a cycle.

**Technology Footprint** – All technology fields of a collection of patent families displayed in percentage and weighted by size.

**Disruptive Technology** – Innovations/technology fields that significantly alter the way that consumers, industries, or businesses operate. Disruptive technologies show above average growth rates and higher than average impact.

**Patent Quality Score** – Quant IP proprietary scoring algorithm predicting the success of a patent family, compared with similar patents.

**Patent Rating** – Quant IP proprietary patent rating with 4 categories AAA (top 10%), AA (top 30%), A (top 50%) and B (bottom 50%), derived from the Patent Quality Score.

## Quant IP Benchmarking

**Reference Applicant** - The applicant of interest.

**Quant IP Peer Group** - All applicants that are active in the same technological fields as the reference applicant including the reference applicant. Quant IP uses several similarity metrics on patent level and company level (tech footprint) to derive a peer group of the technological competitors.

**Competitor** - An applicant in the peer group excluding the reference applicant.

**Patent Portfolio** – All patent documents assigned to an applicant.

**Patent Portfolio Quality Score** – Average Quant IP Quality Score for a portfolio of inventions .

**Technology Growth Rate** – Ratio of inventions published in the last 12 months over the relevant applicant portfolio.

**Technology Benchmark** – Ranked list of applicants inside the peer group based on technology competitiveness (innovation strength). The Benchmarking is based on the size of the relevant patent portfolio, the technology growth rate and the patent portfolio quality score.

## Disclaimer (1/2)

This report is provided by Quant IP GmbH, Nymphenburger Straße 5, 80335 (hereinafter referred to as “Quant IP”) to institutional investors only. It must not be provided to any other third party, including retail clients.

This report is for information purposes only and does not take into account specific circumstances of any recipient. The information contained herein does not constitute the provision of investment advice. It is not intended to be and should not be construed as a recommendation, offer or solicitation to acquire, or dispose of, any of the financial instruments and/or securities mentioned in this document and will not form the basis or a part of any contract or commitment whatsoever. Investors should seek independent professional advice and draw their own conclusions regarding suitability of any transaction including the economic benefits, risks, legal, regulatory, credit, accounting and tax implications.

The past performance of financial instruments is not indicative of future results. No assurance can be given that any financial instrument or issuer described herein would yield favourable investment results. Any forecasts or price targets shown for companies and/or securities discussed in this document may not be achieved due to multiple risk factors including without limitation market volatility, sector volatility, corporate actions, the unavailability of complete and accurate information and/or the subsequent transpiration that underlying assumptions made by Quant IP or by other sources relied upon in the document were inapposite.

The information in this report is based on public data obtained from sources believed by Quant IP to be reliable and in good faith, but no representations, guarantees or warranties are made by Quant IP with regard to accuracy, completeness or suitability of the data. Quant IP has not performed any independent review or due diligence of publicly available information regarding an unaffiliated reference asset or index. The opinions and estimates contained herein reflect the current judgement of the author(s) of the report on the date of this document and are subject to change without notice. Quant IP does not have an obligation to update, modify or amend this report or to otherwise notify a reader thereof in the event that any matter stated herein, or any opinion, projection, forecast or estimate set forth herein, changes or subsequently becomes inaccurate.

Quant IP has prepared this report and all its content to the best of its knowledge and belief. Quant IP has exercised due diligence in the selection of raw data providers, the development of analytical tools, and the verification of the results of this report.

## Disclaimer (2/2)

Although Quant IP shall obtain information for inclusion in the report from sources that Quant IP considers reliable, the data, information and all content in this report is provided “as is” Neither Quant IP nor any of its affiliates, any of its officers and employees or any of its direct or indirect information providers nor any other third party involved in or related to the compilation of or creation of this report, or any component thereof makes any representation or warranty of any kind either express or implied, with respect to the data, information and all content, the results to be obtained by the use thereof or any other matter Further Quant IP expressly disclaim any and all implied warranties, including without limitation, warranties of originality, accuracy, completeness, timeliness, merchantability and fitness for a particular purpose.

Neither Quant IP nor any of its respective directors, officers or employees shall in any event have any liability to the recipient(s) of this report or any third party for any damages of any kind arising out of, or in connection with any errors, omissions or misinterpretations of content of this report.

Quant IP may provide hyperlinks to websites of entities mentioned in this report, however the inclusion of a link does not imply that Quant IP endorses, recommends or approves any material on the linked page or accessible from it. Quant IP does not accept responsibility whatsoever for any such material, nor for any consequences of its use.

This document is for the use of the addressees only and may not be reproduced, redistributed or passed on to any other person or published, in whole or in part, for any purpose, without the prior, written consent of Quant IP. The manner of distributing this document may be restricted by law or regulation in certain countries, including the United States. Persons into whose possession this document may come are required to inform themselves about and to observe such restrictions. By accepting this report, a recipient hereof agrees to be bound by the foregoing limitations.

Additional Information for certain countries:

**United States:** This report is intended for distribution in the United States solely to “institutional investors” and “major US institutional investors”, as defined in Rule 15a-6 under the Securities Exchange Act of 1934.

**United Kingdom:** This report is directed exclusively to eligible counterparties and professional clients. It is not directed to retail clients. No persons other than an eligible counterparty or a professional client should read or rely on any information in this document.

**Switzerland:** The financial instruments mentioned in this report do not constitute a participation in a collective investment scheme in the sense of the Swiss Collective Investment Schemes Act (CISA). This report, the information contained herein as well as any other publication in connection with the financial instruments mentioned herein may be distributed exclusively to qualified investors as defined in the CISA and may only be made available to such qualified investors.