

**Spatial Genomics, Transcriptomics and Proteomics Solutions; Global Market Report**

*Dissertation submitted in partial fulfillment of the requirement for the degree of*

**BACHELOR OF TECHNOLOGY**

**IN**

**BIOTECHNOLOGY**

By

**NISHTA GARG**

**181839**

UNDER THE GUIDANCE OF

**Gopal Singh Bisht**

**Jasparam Kaur**

**(Roots Analysis Pvt. Ltd.)**



**JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT**

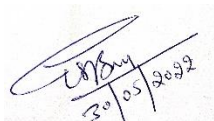
**MAY 2022**

# CERTIFICATE

This is to certify that the work reported in the Bachelor of Technology academic report entitled '*Spatial Genomics, Transcriptomics and Proteomics Solutions; Global Market Report*' submitted by **Nishta Garg** in partial fulfillment for the award of degree of B.Tech. Biotechnology from **Jaypee University of Information & Technology, Wagnaghat** has been carried out under my supervision. This report was not submitted to any other University or Institute in full or in part for the award of any other degree, certificate or other titles.

  
Self Attested

Ms. Jasparam Kaur  
Senior Business Analyst  
RootsAnalysis Pvt. Ltd.  
Date: May 14, 2022

  
30/05/2022

Dr. Gopal Singh Bisht  
Associate Professor  
Department of Biotechnology and Bioinformatics  
Jaypee University of Information Technology

## **ACKNOWLEDGEMENT**

It is my pleasure to be indebted to various people, who are directly or indirectly contributing to the development of this work and who influence my thinking, behavior, and acts during the whole project as any knowledge is incomplete without the right guidance of a mentor.

I express my sincere gratitude to Mr. Gaurav Chaudhary for providing me the opportunity to work here at Roots Analysis Pvt. Ltd, Mohali (Punjab).

*I am thankful to Ms. Jasparam Kaur for providing her constant support, cooperation, and motivation during this period and other team members who provided their valuable suggestions. I would also like to acknowledge with great appreciation the key role played by my valued advisor Mrs. Rupali Chaudhary in her immensely useful observations and advice at crucial points during my project.*

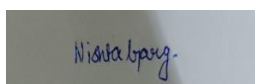
*Finally, I am profoundly thankful to all the Roots Analysis members who have supported me throughout my internship period and to my parents for their inspiration, constant guidance and motivation at all stages of my life.*

**Nishta Garg**

(181839)

## DECLARATION

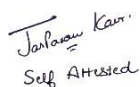
I hence state that the work reported in the B.Tech. academic report entitled '*Spatial Genomics, Transcriptomics and Proteomics Solutions; Global Market Report*' submitted at **Jaypee University of Information Technology, Waknaghat** is an authentic record of my work carried out under the guidance and direction of **Mr. Gaurav Chaudhary** and **Ms. Jasparam Kaur**. I have not presented this work somewhere else for any other degree or qualification.



Nishta Garg (181839)

Department of Biotechnology & Bioinformatics JUIT,  
Waknaghat

Certified that the student's statement above is accurate to the best of our knowledge and belief. Roots Analysis holds the copyright of the results reported in this article. In no circumstances will the information be exchanged with third parties without the company's prior consent.



Ms. Jasparam Kaur

Senior Business Analyst

Roots Analysis Pvt. Ltd.

## **ABSTRACT**

Genomics plays an integral role in predicting, diagnosing and treating diseases. Spatial biology is a new dimension of genomics that not only studies the expression of genes but also predicts the location of genes. The location of genes provides better insights into the cellular landscape thus helping in improved diagnosis of a disease. In the current scenario, researchers are seemingly more interested in understanding how the cells interact among themselves and to observe those interactions spatial biology solutions are growing at an unprecedented pace. These solutions provide tissue analysis and whole slide imaging at single cell resolution leading to biomarker development.

It is interesting to note that these solutions have also been utilized during the time of COVID – 19 to predict the location of genes and study their expression. These technologies allow researchers to have deeper understanding of tissues and the cellular interactions occurring between them.

The '*Spatial Genomics, Transcriptomics and Proteomics Solutions; Global Market Report*' report features an extensive study of the current market landscape and future opportunities associated with the spatial biology solutions industry in the healthcare domain.

# TABLE OF CONTENTS

- 1. PROJECT APPROACH**
  
- 2. PREFACE**
  - 2.1. Scope of the Report
  - 2.2. Key Questions Answered
  - 2.3. Chapter Outlines
  
- 3. INTRODUCTION**
  - 3.1. Chapter Overview
  - 3.2. Spatial Biology Solutions
  - 3.3. Live Cell Instruments
  
- 4. SPATIAL GENOMICS, TRANSCRIPTOMICS AND PROTEOMICS SOLUTIONS; GLOBAL MARKET REPORT: MARKET LANDSCAPE**
  - 4.1. Chapter Overview
  - 4.2. Methodology
  - 4.3. Spatial Genomics, Transcriptomics and Proteomics Solutions: List of Companies
    - 4.3.1. Spatial Products Database
    - 4.3.2. Live Cell Instruments Database
  - 4.4. Types of Analysis
    - 4.4.1. Patent Analysis
    - 4.4.2. Publication Analysis
  
- 5. SPATIAL GENOMICS, TRANSCRIPTOMICS AND PROTEOMICS SOLUTIONS GLOBAL MARKET REPORT: COMPANY PROFILES**
  - 5.1. Chapter Overview
  - 5.2. Company A
    - 5.2.1. Company Overview
    - 5.2.2. Financial Information
    - 5.2.3. Recent Developments and Future Outlook

- 5.3. Company B
  - 5.3.1 Company Overview
  - 5.3.2. Financial Information
  - 5.3.3. Recent Developments and Future Outlook
  
- 5.4. Company C
  - 5.4.1 Company Overview
  - 5.4.2. Financial Information
  - 5.4.3. Recent Developments and Future Outlook
  
- 5.5. Company D
  - 5.5.1 Company Overview
  - 5.5.2. Recent Developments and Future Outlook
  
- 5.6. Company E
  - 5.6.1 Company Overview
  - 5.6.2. Recent Developments and Future Outlook
  
- 5.7. Company F
  - 5.7.1 Company Overview
  - 5.7.2. Recent Developments and Future Outlook
  
- 5.8. Company G
  - 5.8.1 Company Overview
  - 5.8.2. Recent Developments and Future Outlook
  
- 5.9. Company H
  - 5.9.1 Company Overview
  - 5.9.2. Recent Developments and Future Outlook
  
- 6. PROJECT LEARNING OUTCOMES**
- 7. REFERNCES**

# PROJECT APPROACH

The report Spatial Genomics, Transcriptomics and Proteomics Solutions; Global Market Report has been synthesized using various primary and secondary resources. Table 1.1 presents these in detail.

### Table 1.1 Report Sources and Market Insights

#### Information Sources

Secondary Research



Investor Presentations	Annual Reports	Press Releases
SEC Filings	Industry Databases	Other Analysts' Opinion Reports

Primary Research



Interviews conducted with senior representatives of industry stakeholders

#### Market Insights

Industry Landscape	Key Growth Drivers	Challenges	Future Trends / Scenarios
--------------------	--------------------	------------	---------------------------

#### Data Triangulation

In-house Experts	Industry Stakeholders (Via Primary Research)	Client Feedback (Ongoing pre / post project release)
------------------	---	---



## PREFACE

### 2.1 SCOPE OF THE REPORT

The “*Spatial Genomics, Transcriptomics and Proteomics Solutions; Global Market Report, Distribution by Company Size (Large, Mid – sized, Small), Distribution by Geography, Distribution by Type of Sample, Distribution by Therapeutic Area, Distribution by End User, 2022-2035*” report features an extensive study of the current market landscape and the likely future potential associated with the spatial profiling technologies, assays and services market. The report also includes an in-depth analysis, highlighting the capabilities of various industry stakeholders engaged in this field. Amongst other elements, the report features:

- A detailed review of the overall landscape of the spatial genomics, transcriptomics and proteomics market, highlighting the contributions of industry players, along with information on their year of establishment, company size, ownership, geographical location of headquarters, commercial availability, types of solution offered, types of sample(s) analyzed, supported labware for sampling, type of molecule(s) analyzed, detection method(s) used, maximum plex level, quantification capability of analyte, research area(s), application area(s) and compatible sample source.
- A detailed competitiveness analysis of products based on several relevant parameters, such as supplier power (based on the experience of the developer and company size) and product specifications (types of sample(s) analyzed, supported labware for sampling, type of molecule(s) analyzed, detection method(s) used, maximum plex level, quantification capability of analyte and compatible sample source).
- Elaborate profiles of prominent solution providers in this domain. Each company profile includes a brief overview of the company, its financial information (*if available*), information on its spatial analysis-related product portfolio, recent developments, and an informed outlook.
- An analysis of the partnerships and collaborations established for spatial genomics, transcriptomics and proteomics solutions during 2017-2022, featuring a detailed set of analyses based on various parameters, such as the type of partnership, year of partnership,

therapeutic areas involved, geographical location of the companies involved and the most active players.

- A detailed analysis of various investments (since 2017) made in the companies engaged in this domain through seed financing, venture capital financing, capital raised from IPOs, equity and subsequent offerings, grants and debt financing.
- An in-depth analysis of the patents that have been filed / granted for spatial profiling solutions since 2003. It highlights trends across the key parameters associated with the patents, including type of patent, patent application year, publication year, patent age, issuing authority / patent offices involved, Cooperative Patent Classification (CPC) symbols, emerging areas (in terms of number of patents filed / granted), region wise distribution, leading industry and non-industry players (on the basis of number of patents) and individual patent assignees (in terms of size of intellectual property portfolio).
- A detailed review 800+ peer-reviewed, scientific articles related to research on spatial solutions, based on several parameters, such as year of publication, type of publication, and popular keywords. The chapter also provides information on the top journals, top institutes and top authors (*in terms of number of articles published*).
- A detailed review of the overall landscape of the Live Cell Instruments market, highlighting the contributions of industry players, along with information on their year of establishment, company size, ownership, geographical location of headquarters, commercial availability, microscope configuration, instrument weight, availability of integrated incubator, environmental parameters controlled, availability of multi – user mode, supported labware, Z-stack imaging capability, autofocusing capability along with the imaging modalities.

One of the key objectives of the report was to estimate the existing market size and the potential future growth opportunities for spatial genomics, transcriptomics and proteomics solutions providers. Based on multiple parameters involved in spatial analysis of tissues, and partnerships inked in the last few years for outsourcing of such operations. We have developed informed estimates on the evolution of the market for the period 2022-2035. Our year-wise projections of the current and forecasted opportunity have further been segmented across types of samples (DNA, RNA, Protein), end users (academic research institutes, pharmaceutical companies), therapeutic areas (immunology, oncology, immune-oncology, neurology, developmental biology and infectious diseases), company size (large, mid – sized, small) and key geographical locations (North America, Europe and Asia- Pacific and the Rest of the World). In order to account for future uncertainties and to add robustness to our model, we have provided three market forecast

scenarios namely the conservative, base and optimistic scenarios, which represent different tracks of the industry's evolution.

The research, analysis and insights presented in this report are backed by a deep understanding of key insights gathered from both secondary and primary research. The opinions and insights presented in this study were influenced by discussions conducted with several stakeholders in this domain.

The report features detailed transcripts of discussions held with the following stakeholders:

- Stakeholder I, (Senior Director, Mid – sized Company)
- Stakeholder II (Co - founder, Small Company)
- Stakeholder III (Senior Vice President of Marketing, Small Company)

All actual figures have been sourced and analyzed from publicly available information forums and primary research discussions. Financial figures mentioned in this report are in USD, unless otherwise specified.

## **2.2 KEY QUESTIONS ANSWERED**

- Which are the key geographies where spatial analysis solutions providers are located?
- Which analytical techniques are leveraged by the solution providers engaged in this domain?
- Who are the leading spatial solutions developers?
- For which disease indications are spatial analysis solutions currently available?
- Which partnership models are commonly adopted by stakeholders offering spatial profiling solutions?
- What is the evolving trend of publications focused on spatial analysis-based technologies?
- Who are the key investors in this domain?
- Which companies are actively filing patents to drive innovation in this niche segment?
- How is the current and future opportunity likely to be distributed across key market segment?

## **2.3 CHAPTER OUTLINES**

**Chapter 2** is an executive summary of the insights captured in our research. It offers a high-level view on the likely evolution of the spatial analysis solutions market in the mid to long term.

**Chapter 3** is an introductory chapter that highlights the importance of spatial profiling and spatial phenotyping for tissue analysis. The chapter describes the evolution of spatial technologies to do spatial analysis of tissues and cells, along with information on various analytical techniques that

form the basis for such technologies. In addition, the chapter highlights the need for spatial analysis along with the advantages and limitations of such solutions. Further, the chapter provides an overview of the existing challenges and future anticipated trends in this domain.

**Chapter 4** provides an overview of the spatial solutions market, including information on 40+ players offering these platforms for one or multiple steps involved in the analysis and imaging of cellular landscape. It features an in-depth analysis of the industry players, based on a number of parameters such as year of establishment, company size (Large, Mid – sized, Small), ownership (private, public), geographical location of headquarters (North America, Europe, Asia-pacific), commercial availability (commercialized, underdeveloped), types of solution offered (product, service), types of sample(s) analyzed (fresh frozen, formalin-fixed paraffin embedded, tissue microarrays, cellular), supported labware for sampling (test tubes, slides, well plates), type of molecule(s) analyzed (RNA, DNA, protein), detection method(s) used (fluorescence, brightfield, mass spectrometry), maximum plex level (ranges from tens to thousands), quantification capability of analyte, research area(s), application area(s) and compatible sample source (human, murine).

**Chapter 5** provides an insightful competitiveness analysis of spatial analysis-based technologies, based on supplier strength (in terms of years of experience), and portfolio diversity (based on type of sample, commercial availability, area of application, type of technology / software integrated).

**Chapter 6** includes detailed profiles of prominent solution providers in this domain. Each company profile includes a brief overview of the company, its financial information (*if available*), information on its spatial analysis-related product portfolio, recent developments, and an informed outlook

**Chapter 7** presents an analysis of the partnerships and collaborations established for spatial genomics, transcriptomics and proteomics solutions during 2017-2022, featuring a detailed set of analyses based on various parameters, such as the type of partnership, year of partnership, therapeutic areas involved, geographical location of the companies involved and the most active players.

**Chapter 8** presents a detailed analysis of various investments (since 2017) made in the companies engaged in this domain through seed financing, venture capital financing, capital raised from IPOs, equity and subsequent offerings, grants and debt financing.

**Chapter 9** presents in-depth analysis of the patents that have been filed / granted for spatial profiling solutions since 2003. It highlights trends across the key parameters associated with the patents, including type of patent, patent application year, publication year, patent age, issuing authority / patent offices involved, Cooperative Patent Classification (CPC) symbols, emerging areas (in terms of number of patents filed / granted), region wise distribution, leading industry and non-industry players (on the basis of number of patents) and individual patent assignees (in terms of size of intellectual property portfolio).

**Chapter 10** presents a detailed review 800+ peer-reviewed, scientific articles related to research on spatial solutions, based on several parameters, such as year of publication, type of publication, and popular keywords. The chapter also provides information on the top journals, top institutes and top authors (*in terms of number of articles published*).

**Chapter 11** presents a detailed review of the overall landscape of the Live Cell Instruments market, highlighting the contributions of industry players, along with information on their year of establishment, company size (Large, Mid-sized, Small), ownership (private, public), geographical location of headquarters (North America, Europe, Asia- pacific), commercial availability (commercialized, underdeveloped), microscope configuration (inverted, upright), instrument weight, availability of integrated incubator, environmental parameters controlled (temperature, humidity, gas control, Ph, osmolarity), availability of multi – user mode, supported labware (flasks, dishes, slides, plates, well plates, microfluidic chips, hemocytometers), Z- stack imaging capability, autofocus capability, mode of imaging (fluorescence, brightfield, phase – contrast, confocal, differential interference contrast, colorimetric, hoffman modulation contrast), number of fluorescent channels and magnification.

**Chapter 12** presents an insightful market forecast analysis, highlighting the future potential of the spatial genomics, transcriptomics and proteomics solutions market, till 2035. In order to provide a detailed future outlook, our projections have been segmented across different segments on the basis of [A] types of samples (DNA, RNA, Protein), [B] end users (academic research institutes, pharmaceutical companies), [C] therapeutic areas (immunology, oncology, immune-oncology, neurology, developmental biology and infectious diseases), [D] company size (large, mid – sized, small) [E] key geographical locations (North America, Europe and Asia- Pacific and the Rest of the World).

**Chapter 13** is a collection of interview transcripts of the discussions held with key stakeholders in this market.

**Chapter 14** is a summary of the overall report, presenting the insights on the contemporary market trends and the likely evolution of the spatial analysis market.

**Chapter 15** is an appendix, which provides tabulated data and numbers for all the figures provided in the report.

**Chapter 16** is an appendix, which provides a list of companies and organizations mentioned in this report.

## **INTRODUCTION**

### **3.1 CHAPTER OVERVIEW**

This chapter provides an overview of the spatial biology and its solutions. Spatial Biology predicts what cells are present, where they are present in the tissue and helps in studying the biomarker patterns present. It enables study of cells in their 2D or 3D context. Spatial Biology is an evolving segment of genomics that provides valuable insights inside various tissue types. In fact, spatial transcriptomics, a segment of spatial genomics has been described as the method of the year by journal *Nature* in the year 2020.<sup>1</sup>

Therefore, spatial biology solutions are in great demand, researchers employ such solutions to image whole slides at spatial single cell resolution. These technologies provide high multiplexing, rapid throughput and better resolution.

### **3.2 SPATIAL BIOLOGY SOLUTIONS**

There are several spatial biology solutions (*instruments, assays, software, services*), primarily to support researchers in their single – cell spatial analysis of tissue samples. These platforms enable biomarker quantification at rapid throughput and better resolution. These solutions are designed by keeping in mind several parameters to provide meaningful analytical insights inside the tissues.<sup>2</sup>

The instruments track the location of cells in the similar manner as the GPS tracks and builds the coordinates of location to create a map. Spatial biology, in other words is

being inside the tissue at a molecular level. These spatial instruments enable us to see things that aren't possible with any other technologies or sequencing.<sup>3</sup> Earlier, it was possible to access the spatial data for few biomarkers using immunohistochemical methods, but information of few biomarkers isn't enough for the prediction and diagnosis of diseases. Hence, the new spatial instruments bridge the gap and provides simultaneous measurement of various protein and RNA biomarkers leading to clear understanding of what's happening inside the cell.<sup>4</sup>

Today researchers are utilizing these methods to understand the cellular landscape and biological complexities by simultaneous capturing the arrangement of proteins and RNA biomarkers at single – cell resolution. This data helps in profiling cells spatially and builds a cell atlas to reveal new biological mechanisms that can act as a reference map for carrying outwork in future.

These instruments provide robust data to the researchers in short intervals of time. For instance, sequencing of human genome took 13 years whereas it can be done in just 5 hours today. Similarly, these instruments have the capability to do the analysis in short periods of time providing better and large quantity of data.<sup>5</sup>

These technologies are used in various research areas such as immunology, immune – oncology, immunology, infectious diseases and autoimmune diseases.<sup>6</sup>

These instruments provide a variety of information across different tissue samples and have different modalities.

Spatial Biology Instruments workflow:

- **Sample Preparation:** The first step involved in the analysis is sample preparation. This includes staining any RNA, protein that is required to detect.
- **Image and Profile:** In this step the sample is placed inside the instrument, and it detects biomarkers, image and profile them.
- **Count:** In this step the number of biomarkers is done by automation.
- **Analyze:** This step provides the cell atlas that provides inferences into the cellular landscape.



*In addition to the spatial biology instruments a live cell instrument database was also prepared to give more understanding on the type of microscopes that can be integrated with spatial biology instruments to enhance imaging modalities of the instrument.*

### **3.1 LIVE CELL INSTRUMENTS**

Live cell imaging is an important tool to study various biomedical research domains such as neurology, cell biology, oncology and developmental biology. Live cell imaging is exactly as it sounds like which is imaging of cells while they are live. The live cell imaging is done over a period and hence live cell imaging can also be termed as time lapse imaging.<sup>7</sup> Earlier techniques that were used to image live cells generally compromised either the health of the cells or imaging quality.

But now there are several instruments that are designed in such a manner providing high quality imaging while preserving the architecture of live cells.<sup>8</sup>

It is very important to image cells while preserving their morphology and live cell instruments are either integrated with an incubator or can be placed inside an incubator to maintain healthy state of cells in their culture medium. There are a lot of microscopy techniques that can be used to image cells such as fluorescence, brightfield, phase contrast, confocal, differential interference microscopy.<sup>9</sup>

## **MARKET LANDSCAPE**

### **4.1 CHAPTER OVERVIEW**

Due to advancement in life sciences domain, more and more researchers are now deploying these solutions for the spatial profiling and phenotyping of cellular landscape. Over past five years the industry has risen at an unprecedented pace and is expected to grow more in the coming years. These solutions are majorly used by researchers in the laboratory and the solutions are used not only used as a product but also as a service.

### **4.2 METHODOLOGY**

Database (in this case) is a list of companies and the type of services provided by these companies. The information about these services provided is usually taken from various sources. These include public records, company websites and other secondary sources. It heads the organization of the report and hence acts as the most significant aspect in the course of enlisting the report comprehensions and insights. Hence, it must be vigorous, thorough and finely structured, which is the key to accurate analysis.

### **4.3 SPATIAL GENOMICS, TRANSCRIPTOMICS AND PROTEOMICS SOLUTIONS: LIST OF COMPANIES**

#### **4.3.1. SPATIAL PRODUCTS DATABASE**

During our research, we were able to identify xx products that are either marketed or under development. Table 4.3.1 lists these products, along with information related to their developer, status of development, xx. Kindly note that data presented in the table is based on detailed secondary research conducted on a *best-effort* basis.

**Table 4.3.1: Spatial Genomics, Transcriptomics and Proteomics Solutions: List of Products**

Developer Information										Type of Solution Offered					
S. No.	Solution Name	Player Name	Type of Player	YoE	Headquarters	Headquarters:employee Count	Employee Count	Company Size	Commercial Avail.	Service	Product	Type of Sample Analyzed	Supporting Labware for Sampling	Type of Molecule(s)	Ass Detection Method
1	GeoMx Digital Spatial Profiling	XXXX	Industry	2003	Washington, US	50k-100k	Large	Public	Yes (2019)	Yes	No	XXX	XXX	XXX	XXX
2	Phenolinger HTM Autom	YYYY	Industry	2015	Massachusetts, US	5k-20k	Mid-sized	Public	Yes (2022)	Yes	No	YYY	YYY	YYY	YYY
3	XXXX	YYYY	Industry	2015	Massachusetts, US	5k-20k	Mid-sized	Public	Yes	Yes	No	FFPE, Tissue Monocary	Slide	Proteins, RNA	Fluorescence Microsc
4	XXXX	YYYY	Industry	2015	Massachusetts, US	5k-20k	Mid-sized	Public	Yes (2022)	Yes	No	FFPE, Fresh Frozen, Tissue Monocary	Slide	Proteins, RNA	Fluorescence Microsc
5	XXXX	YYYY	Industry	1999	California, US	50k-100k	Large	Public	Yes (2017)	No	Yes	FFPE, Fresh Frozen, Tissue Monocary	Slide	Proteins, RNA	Mass Spectrometry
6	XXXX	YYYY	Industry	2012	California, US	100k-500k	Large	Public	Yes (2019)	No	Yes	FFPE, Fresh Frozen	Slide	Proteins, RNA	Fluorescence Microsc
7	XXXX	YYYY	Industry	2003	Washington, US	50k-100k	Large	Public	No	-	-	FFPE, Fresh Frozen	Slide	Proteins, RNA	Fluorescence Microsc
8	XXXX	YYYY	Industry	1980	Massachusetts, US	5.00k-10.00k	Large	Public	Yes (2021)	Yes	Yes	FFPE, Fresh Frozen, Cellular (PBMCs), whole Blood	Slide, Test Tube	Proteins	Fluorescence Microsc
9	XXXX	YYYY	Industry	1980	Massachusetts, US	5.00k-10.00k	Large	Public	Yes (2022)	No	Yes	FFPE, Fresh Frozen, Cellular (PBMCs)	Slide, Test Tube	Proteins	Fluorescence Microsc
10	XXXX	YYYY	Industry	1980	Massachusetts, US	5.00k-10.00k	Large	Public	Yes (2023)	No	Yes	FFPE, Cellular	Slide	Proteins, RNA, DNA, Saccha	Fluorescence Microsc
11	XXXX	YYYY	Industry	2015	Massachusetts, US	1k-5k	Small	Private	Yes (2021)	Yes	Yes	FFPE, Fresh Frozen, Cellular (PBMCs), Adherent	Slide	RNA	Fluorescence Microsc
12	XXXX	YYYY	Industry	2020	North Rhine-West Germany	5k-20k	Mid-sized	Private	Yes	No	Yes	FFPE, Fresh Frozen	Slide	RNA	Fluorescence Microsc
13	XXXX	YYYY	Industry	2014	Vaud, Switzerland	5k-20k	Mid-sized	Private	Yes	No	Yes	FFPE, Fresh Frozen	Slide	Proteins	Fluorescence Microsc
14	XXXX	YYYY	Industry	2014	Vaud, Switzerland	5k-20k	Mid-sized	Private	Yes (2019)	No	Yes	FFPE, Fresh Frozen	Slide	Proteins, RNA	Fluorescence Microsc
15	XXXX	YYYY	Industry	2015	Massachusetts, US	5k-20k	Mid-sized	Private	Yes (2017)	Yes	Yes	FFPE	Slide	Proteins	Fluorescence Microsc
16	XXXX	YYYY	Industry	2006	California, US	5k-20k	Mid-sized	Private	Yes (2018)	Yes	Yes	FFPE, Fresh Frozen, Tissue Monocary, Cellular	Slide	RNA	Fluorescence Microsc
17	XXXX	YYYY	Industry	2006	California, US	5k-20k	Mid-sized	Private	Yes (2020)	Yes	Yes	FFPE, Fresh Frozen, Cellular	Slide	RNA	Brightfield Microscopy
18	XXXX	YYYY	Industry	2006	California, US	5k-20k	Mid-sized	Private	Yes (2019)	No	Yes	FFPE, Fresh Frozen, Tissue Monocary, Cellular	Slide	DNA	Brightfield Microscopy
19	XXXX	YYYY	Industry	2006	California, US	5k-20k	Mid-sized	Private	Yes (2018)	Yes	Yes	FFPE, Fresh Frozen, Tissue Monocary, Cellular	Slide	RNA	Fluorescence Microsc
20	XXXX	YYYY	Industry	2008	California, US	5k-20k	Mid-sized	Private	Yes (2020)	Yes	Yes	FFPE, Fresh Frozen, Cellular	Slide	RNA	Fluorescence Microsc
21	XXXX	YYYY	Industry	2006	California, US	5k-20k	Mid-sized	Private	Yes	Yes	Yes	FFPE, Fresh Frozen	Slide	RNA	Fluorescence Microsc
22	XXXX	YYYY	Industry	2006	California, US	5k-20k	Mid-sized	Private	Yes (2021)	Yes	Yes	FFPE, Fresh Frozen	Slide	RNA	Fluorescence Microsc
23	XXXX	YYYY	Industry	2014	California, US	1k-5k	Small	Private	Yes (2019)	Yes	Yes	FFPE, Fresh Frozen	Slide	Proteins	Brightfield Microscopy
24	XXXX	YYYY	Industry	2016	California, US	2-10	Small	Private	No	-	-	Fresh Frozen	Well plate	RNA	NA
25	XXXX	YYYY	Industry	2016	California, US	5k-20k	Mid-sized	Public	No	-	-	FFPE, Fresh Frozen	Well plate	Proteins, RNA	NA
26	XXXX	YYYY	Industry	2009	Washington, US	1k-5k	Small	Private	Yes (2020)	Yes	Yes	FFPE, Fresh Frozen	Slide	Proteins	Fluorescence Microsc
27	XXXX	YYYY	Industry	2006	California, US	1k-5k	Small	Private	Yes (2018)	Yes	Yes	FFPE, Fresh Frozen	Slide	Proteins, RNA, DNA	NA
28	XXXX	YYYY	Industry	2002	Florida, US	50k-100k	Large	Public	Yes (2019)	Yes	No	FFPE, Cellular	Slide	Proteins, RNA	Fluorescence Microsc
29	XXXX	YYYY	Non-industry	1900	London, UK	50k-100k	Large	NA	Yes (2018)	No	Yes	Tissue Monocary	Slide	Proteins	Mass Spectrometry
30	XXXX	YYYY	Industry	2011	California, US	1k-5k	Small	Private	Yes	Yes	No	FFPE	Well plate	Proteins, RNA, DNA	Brightfield Microscopy
31	XXXX	YYYY	Industry	2012	California, US	100k-500k	Large	Public	No	-	-	FFPE, Fresh Frozen	Slide	Proteins, RNA	Fluorescence Microsc
32	XXXX	YYYY	Industry	2012	California, US	100k-500k	Large	Public	Yes	Yes	No	FFPE, Fresh Frozen	Slide	Proteins, RNA, DNA	NA
33	XXXX	YYYY	Industry	1980	Massachusetts, US	5.00k-10.00k	Large	Private	Yes (2019)	Yes	Yes	FFPE, Tissue Monocary	Slide	Proteins	Fluorescence Microsc
34	XXXX	YYYY	Non-industry	2009	Massachusetts, US	20k-50k	Mid-sized	NA	No	-	-	FFPE, Cellular	Slide	Proteins, RNA, DNA	Fluorescence Microsc
35	XXXX	YYYY	Industry	2016	California, US	1k-5k	Small	Private	No	-	-	FFPE, Fresh Frozen, Cellular	Slide	Proteins, RNA, DNA	Fluorescence Microsc
36	XXXX	YYYY	Non-industry	2003	Massachusetts, US	50k-100k	Large	NA	No	-	-	Fresh Frozen	Slide, Well plate	Proteins, RNA	Fluorescence Microsc
37	XXXX	YYYY	Non-industry	2003	Massachusetts, US	50k-100k	Large	NA	No	-	-	Fresh Frozen	Slide	RNA	Fluorescence Microsc
38	XXXX	YYYY	Non-industry	2003	Massachusetts, US	50k-100k	Large	NA	No	-	-	Fresh Frozen	Slide	RNA	Fluorescence Microsc

Some examples of parameters that were considered:

- Type of tissue sample analyzed: Fresh Frozen and FFPE (formalin fixed and paraffin embedded) were taken into consideration. The instrument can either process both types of samples or either of them.
- Type of biomolecule analyzed: Some instruments have the capability to analyze RNA or protein or DNA while some can analyze either two or all three of them.
- Supported Labware: The instruments support a standard set of labware to be compatible with it.
- Detection Method: The instruments employ different detection methods such as fluorescence microscopy, brightfield microscopy or mass spectrometry.
- Compatible source of sample: The instruments are evaluated based on source of samples that they can process such as some instruments are compatible with both human and murine samples.
- Objectives: The magnification that an instrument can provide is an important parameter which was taken into consideration.

### 4.3.2. LIVE CELL INSTRUMENTS DATABASE

During our research, we were able to identify xx products that are either marketed or under development. Table 4.3.2 lists these products, along with information related to their developer, status of development, xx. Kindly note that data presented in the table is based on detailed secondary research conducted on a best-effort basis.

**Table 4.3.2: Spatial Genomics, Transcriptomics and Proteomics Solutions: List of Products**

S. No.	Equipment Name	Company Name	Commercial Availability	Product Dimensions (W*D*H)	Weight (Kg)	Microscope Conf	Microscope Operating	Incubator Integrated	Environmental Parameters Control	Availability of Modules	Usability Features			Imaging Features		
											Fluorescence	Brightfield	Phase Contrast	Fluorescence	Cham	
1	XXX	PPP	Yes (2020)	45.0 x 47.8 x 32	NA	Inverted	3790	No	NA	Yes	Flasks	Dish	NA	No	Fluorescence, Phase Contrast	5
2	XXX	PPP	Yes (2019)	45.0 x 47.4 x 31.9	23.6	NA	0-42.5-95	No	NA	NA	Flasks	Dish	NA	No	Fluorescence, Phase Contrast	2
3	XXX	PPP	Yes (2017)	45.0 x 47.8 x 32	23.6	Inverted	3790	No	NA	Yes	Flasks	Dish	NA	No	Fluorescence, Phase Contrast	2
4	XXX	PPP	Yes (2016)	33.0 x 30.4 x 10.7	6.7	Inverted	20-30	Yes	Temperature, O2, Humidity, Media Flow	NA	Microfluidic	NA	Yes	Fluorescence, Brightfield	1	
5	XXX	PPP	Yes (2018)	55.1 x 43.5 x 45.3	38	NA	20-24-20-75	Yes	Temperature, O2, CO2, Humidity	Yes	Well plates	Yes	Yes	Fluorescence, Brightfield, Confocal, Color	5	
6	XXX	PPP	Yes (2017)	53 x 86 x 48	98	NA	18-30-35-50	Yes	Temperature, CO2, Humidity	NA	Well plates	NA	Yes	Fluorescence, Brightfield	5	
7	XXX	PPP	Yes (2016)	53 x 86 x 48	95	Inverted	15-30-35-50	Yes	Temperature, CO2, Humidity	Yes	Well plates	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	5	
8	XXX	PPP	Yes (2020)	43 x 31 x 33	18	NA	NA	No	NA	NA	Flasks	Dish	Yes	Fluorescence, Brightfield	3	
9	XXX	PPP	Yes	NA	NA	Inverted	43-80-95	Yes	Temperature, O2, CO2, Humidity	Yes	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	4
10	XXX	PPP	Yes (2006)	NA	470	Inverted	15-28-60	Yes	Temperature, O2, CO2, Humidity	Yes	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	NA
11	XXX	PPP	Yes	16.0 x 29.5 x 33.5	12	NA	0-40-95	No	NA	NA	Flasks	Dish	NA	No	Phase Contrast	NA
12	XXX	PPP	Yes	16.0 x 29.5 x 33.5	5	Upright	0-40-95	No	NA	NA	Flasks	Dish	NA	Yes	Phase Contrast	NA
13	XXX	PPP	Yes (2019)	37.4 x 65.4 x 71	46.2	Inverted, Upright	22 ± 3   <85	Yes	Temperature, CO2	NA	Dishes	Well	Yes	Yes	Confocal	36
14	XXX	PPP	Yes (2016)	45.5 x 46.5 x 35.8	26.3	Inverted	NA	Yes	Temperature, O2, CO2, Humidity	NA	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	3
15	XXX	PPP	Yes (2020)	54 x 65 x 73.82	47	NA	NA	Yes	Temperature, O2, CO2, Humidity	Yes	Slides	Yes	Yes	Fluorescence	5	
16	XXX	PPP	Yes (2015)	NA	104	Inverted	15-30-35-50	Yes	Temperature, CO2, Humidity	Yes	Plates	Slide	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	5
17	XXX	PPP	Yes (2021)	NA	104	NA	15-30-35-50	Yes	Temperature, O2, CO2, Humidity	Yes	Plates	Slide	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	8
18	XXX	PPP	Yes (2014)	32 x 33 x 30	9	Inverted	10-31-20-80	No	NA	NA	Flasks	Dish	NA	No	Fluorescence, Brightfield	3
19	XXX	PPP	Yes (2015)	5.6 x 10.6 x 9.5 x 5.6 x 10.6 x 10.7	1	Inverted, Upright	20-25-75	No	NA	NA	NA	NA	Yes	Yes	Fluorescence	3
20	XXX	PPP	Yes (2016)	NA	NA	Inverted, Upright	NA	No	NA	NA	Plates	Yes	Yes	Fluorescence, Brightfield, Confocal, DMR	4	
21	XXX	PPP	Yes (2016)	71 x 64 x 70	136	Inverted	15-35-75	Yes	Temperature, O2, CO2, Humidity	Yes	Dishes	Well	Yes	Yes	Fluorescence, Brightfield	5
22	XXX	PPP	Yes	23.5 x 56.0 x 56.0	10.5	Inverted	NA	No	NA	NA	NA	NA	No	Fluorescence, Brightfield, Phase Contrast	4	
23	XXX	PPP	Yes (2020)	9.0 x 13.3 x 10.0	0.5	Inverted	0-42.5-95	No	NA	NA	Flasks	Dish	NA	No	Brightfield, Phase Contrast	NA
24	XXX	PPP	Yes (2019)	45.7 x 35.6 x 33.0	11.8	Inverted	4-32-90	Yes	Temperature, O2, CO2, Humidity	NA	Well plates	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	4	
25	XXX	PPP	Yes (2017)	50.8 x 81.3 x 45.7	68	NA	NA	Yes	Temperature, CO2, Humidity	NA	Plates	Slide	Yes	Yes	Fluorescence, Brightfield, Confocal	7
26	XXX	PPP	Yes (2018)	45.7 x 45.7 x 58.4	16.4	Inverted	4-32-0-90	Yes	Temperature, O2, CO2, Humidity	NA	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	4
27	XXX	PPP	Yes	40.6 x 35.5 x 53.3	11.8	NA	4-32-90	NA	NA	NA	Flasks	Dish	NA	No	Fluorescence	3
28	XXX	PPP	Yes	33.0 x 40.6 x 53.3	9.6	Inverted	4-32-90-90	NA	NA	NA	Well plates	Yes	Yes	Brightfield, Phase Contrast	NA	
29	XXX	PPP	Yes (2013)	34.3 x 47.2 x 32.2	20	Inverted	4-32-90-90	Yes	Temperature, O2, CO2, Humidity	NA	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	4
30	XXX	PPP	Yes	35.5 x 48.2 x 58.4	15.3	Inverted	4-32-90-90	NA	NA	NA	Well plates	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	4	
31	XXX	PPP	Yes	45.5 x 46.5 x 35.8	51	Inverted	NA	NA	NA	NA	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield	4
32	XXX	PPP	Yes (2020)	22.5 x 13.1 x 20.5	2	Inverted	0-42.5-95	No	NA	NA	Flasks	Dish	NA	No	Brightfield	NA
33	XXX	PPP	Yes (2020)	60.0 x 41.5 x 38.0	48	Inverted	NA	Yes	Temperature, CO2	NA	Dishes	Plate	NA	No	Fluorescence	3
34	Promover Cell and Tissue Culture	PPP	Yes (2011)	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
35	CELLCYTE X Live Cell Imaging	PPP	Yes (2019)	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
36	YYY	PPP	Yes (2021)	19.5 x 30.5 x 22.0	4.5	NA	5-40-20-95	No	NA	NA	Flasks	Dish	NA	Yes	Brightfield	NA
37	YYY	PPP	Yes	2.26 x 3.58 x 2.15	5.6	NA	5-40-20-95	No	NA	NA	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield	1
38	YYY	PPP	Yes	2.11 x 1.46 x 1.88	3.2	NA	5-40-20-95	No	NA	NA	Flasks	Dish	NA	Yes	Fluorescence, Brightfield	1
39	YYY	PPP	Yes (2020)	14.0 x 16.6 x 13.5	1.3	NA	5-40-20-95	No	NA	NA	Flasks	Dish	NA	No	Fluorescence, Brightfield	2
40	YYY	PPP	Yes (2021)	14 x 16.6 x 13.5	1.3	NA	5-40-20-95	No	NA	Yes	Flasks	Dish	NA	No	Fluorescence, Brightfield	2
41	YYY	PPP	Yes (2019)	34.5 x 39.6 x 17.1	9	NA	5-40-20-95	No	NA	NA	Flasks	Dish	NA	No	Brightfield, Phase Contrast	NA
42	YYY	PPP	Yes (2021)	14 x 16.6 x 13.5	1.3	Inverted	5-40-20-95	No	NA	NA	Flasks	Dish	NA	No	Brightfield, Phase Contrast	NA
43	YYY	PPP	Yes (2020)	9.0 x 13.3 x 10.0	0.5	Inverted	0-42.5-95	No	NA	NA	Flasks	Dish	NA	No	Brightfield, Phase Contrast	NA
44	YYY	PPP	Yes (2021)	14 x 16.6 x 13.5	1.3	NA	5-40-20-95	No	NA	NA	Flasks	Dish	NA	No	Fluorescence, Brightfield	2
45	YYY	PPP	Yes	10.5 x 18 x 18	1.05	Inverted	20-45-20-95	No	NA	NA	Flasks	Well	NA	No	Brightfield	NA
46	YYY	PPP	Yes	24 x 17.5 x 16.5	3.2	Inverted	0-42.5-95	No	NA	NA	Flasks	Dish	NA	No	Brightfield	NA
47	YYY	PPP	Yes (2017)	24 x 17.5 x 16.5	3.25	Inverted	0-42.5-95	No	NA	NA	Flasks	Dish	NA	No	Fluorescence, Brightfield, Phase Contrast	3
48	YYY	PPP	Yes	24 x 14 x 16.5	3.2	Inverted	0-42.5-95	No	NA	NA	Flasks	Dish	NA	No	Fluorescence, Brightfield	3
49	YYY	PPP	Yes (2017)	37.4 x 43.9 x 46.9	11	Inverted	0-42.5-95	No	NA	NA	Flasks	Dish	Yes	Yes	Fluorescence, Brightfield, Phase Contrast	3
50	YYY	PPP	Yes	NA	NA	Inverted	NA	No	NA	NA	Dishes	Yes	Yes	Confocal	8	
51	YYY	PPP	Yes	NA	NA	Inverted	NA	NA	NA	NA	Dishes	Yes	No	Confocal	to Settings to activate Windows	

This database shows the product portfolio of live cell instruments. The database was based on several parameters and some examples of these parameters have been summarized as follows.

- Commercial Availability: The commercial availability of the instruments has been taken into consideration. Almost all the instruments are commercially available.
- Product Dimensions and Weight: The product dimensions (W\*D\*H) and weight (Kg) of the instruments are taken into consideration.

- Configuration of Microscope: The configuration of microscope (Inverted, Upright) has been taken into consideration.
- Operating Conditions: The instruments operate in standard temperature and humidity conditions.
- Key Environmental Parameters: The instruments can maintain temperature, CO<sub>2</sub> level, O<sub>2</sub> level, humidity, pH, osmolarity for preserving themorphology of live cells.
- Incubator Integrated: Some instruments have an integrated chamber, and some can beplaced inside an incubator.
- Supported Labware: The instruments support a standard set of vessels to be used with them.
- Z – Stacking and Autofocusing: Some of the instruments support 3D stacking and automatically focuses specimen to improve image quality.
- Mode of Detection: The instruments can provide imaging in multiple modes such as fluorescence, brightfield, confocal, colorimetric, phase contrast and differential interference contrast.
- Number of Fluorescent channels: The instruments can image in different colors that is different fluorescent channels.
- Research areas: Different research areas are investigated using different instruments such as oncology, immunology, immune – oncology, neurology and infectious diseases.

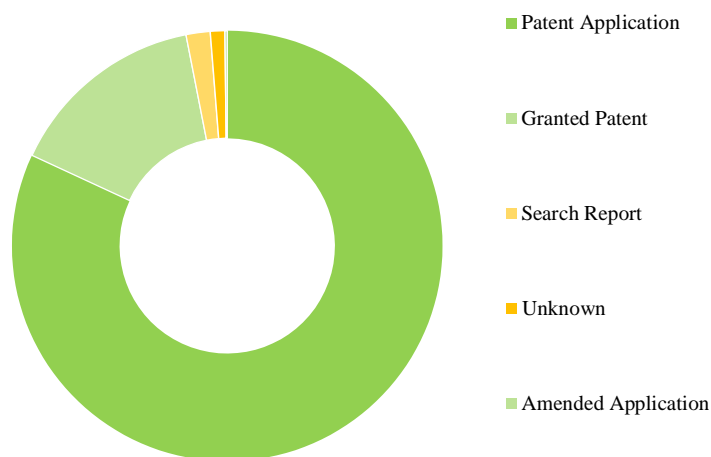
## **4.4 TYPES OF ANALYSIS**

### **4.4.1. PATENT ANALYSIS**

The field of spatial biology has witnessed several advancements and development of novel devices in the last few years. Ongoing research in this domain has led to an expansion of the intellectual capital associated with spatial profiling technologies. Several patents have been filed by companies offering these devices to protect novel intellectual property generatedwithin this field. This analysis provides an overview of the filed / granted patents related to spatial instruments that can be used for biomarker development, gene expression analysis etc.

Figure 4.4.1.1 presents the number of patents with respect to their age

### Figure 4.1 Patent Analysis: Distribution by Type of Patents



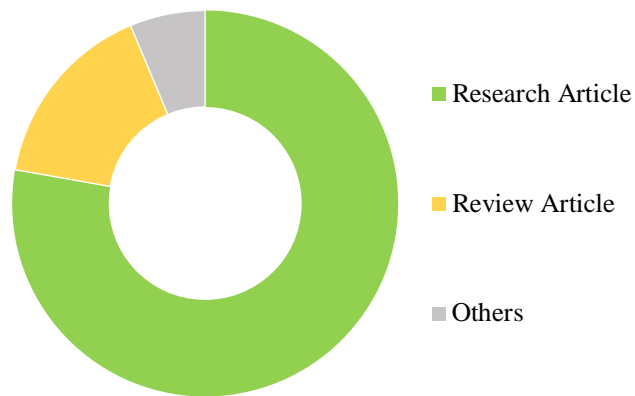
As can be observed in the figure, most of the patents (XX%) have been filed followed by a significant percentage of the patents that has been granted.

#### **4.4.2. PUBLICATION ANALYSIS**

The field of spatial biology has witnessed several advancements and development of novel devices in the last few years. Ongoing research in this domain has led to an expansion of the intellectual capital associated with spatial profiling technologies. Several research and review papers have been published in this domain by the researchers using the solutions has been companies offering within this field. This analysis provides an overview of the publishedpapers related to spatial instruments that can be used for biomarker development, geneexpression analysis etc.

Figure 4.4.2.1 presents the number of patents with respect to their age

**Figure 4.4.2.1 Publication Analysis: Distribution by Type of Publication**



---

As can be observed in the figure, most of the publications (XX%) are research articles.

## COMPANY PROFILES

### 5.1 CHAPTER OVERVIEW

This chapter includes detailed profiles of players that offer solutions (*platforms / products / services*) for spatial analyses to different end users, including academic institutes, research laboratories, and biotechnology companies. Each profile features a brief overview of the company, its financial information (*if available*), and details on its product and technology portfolio. In addition, it includes a section on the recent developments, highlighting key achievements, partnering activity, and the strategies that are likely to be adopted by different players in pursuit of future growth. It is worth highlighting that the companies profiled in this chapter were shortlisted based on the product competitiveness analysis presented in Chapter X of the report. Table x.x provides the list of companies (*arranged alphabetically*), across different regions, which have been profiled in this chapter.

**Table 5.1 Spatial Genomics, Transcriptomics and Proteomics Solutions: Leading Developers**

S. No.	Company Name	Year of Establishment	Headquarters
1	Company A	2019	Michigan, US
2	Company B	Sample Text	Sample Text
3	Company C	Sample Text	Sample Text
4	Company D	Sample Text	Sample Text
5	Company E	Sample Text	Sample Text
6	Company F	Sample Text	Sample Text
7	Company G	Sample Text	Sample Text
8	Company H	Sample Text	Sample Text
9	Company I	Sample Text	Sample Text



## 5.2. COMPANY A

### 5.2.1. COMPANY OVERVIEW

Company A is a US-based firm offering end-to-end spatial biology related solutions (*instruments, assays, software, services*), primarily to support researchers to study molecular interactions in three dimensions. The company leverages its novel XX technology to develop multiple spatial phenotyping platforms for visualizing and quantifying biomarkers in tissue samples such as FFPE. The company launched XX Analysis System in the year 2008 for profiling expression of proteins and RNA. It is interesting to note that, the firm's XX system has been cited in over 4,600 peer-reviewed publications. The company launched its first spatial platform in the year 2019, XX Spatial Profiler to profile RNA and protein targets in different sample types, primarily FFPE. Also, the platform's unparalleled consolidation of high throughput and multiplex permits the researchers to quantitatively evaluate the biological implications within tissues leading to 60 peer-reviewed publications to date. Further, the company provides services through xx Program to support researchers in visualizing and quantifying up to 1,000 RNA biomarkers in single cells while preserving their spatial context.

**Table 5.2.1.1. Company A: Company Snapshot**

Particulars	Specifications
Headquarters	XX
Year of Establishment	XX
Number of Employees	XX
Executive Team Members	<ul style="list-style-type: none"><li>▪ <b>Candidate A:</b> Sample Text</li><li>▪ <b>Candidate B:</b> Sample Text</li><li>□ <b>Candidate C:</b> Sample Text</li><li>□ <b>Candidate D:</b> Sample Text</li><li>□ <b>Candidate E:</b> Sample Text</li><li>□ <b>Candidate F:</b> Sample Text</li></ul>

### 5.2.2 FINANCIAL INFORMATION

The financial year of Company A spans from January to December. The company's revenues have increased at a CAGR of X% between 2017 and 2021. In 2021, Company A reported total revenues worth USD yyy million, representing an increase of xx% from the previous year's performance (USD yyy million). The revenues generated by the sales of its proprietary products and services represented USD yyy million of the total revenue. Also, the company's spatial solution, contributed USD yyy Million to the total revenue. The company believes that its instrument placements are important metrics to augment its business by enabling it to increase its clientele and providing insights into anticipated recurring revenue for consumables and instrument services.

### 5.2.3. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

	Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
	Making Key Appointments to Strengthen Management Team	<b>March 2021:</b> Sample Text <b>July 2021:</b> Sample Text	Sample Text
	Strategic Initiative 4	<b>2019-2021: Sample Text</b>	Sample Text

## 5.3. COMPANY B

### 5.3.1. COMPANY OVERVIEW

Company B is a US-based firm offering end-to-end spatial biology related solutions (*instruments, assays, software*), primarily to support researchers for their single – cell and spatial analysis. The company leverages its highly multiplexed next generation platform for visualizing and quantifying biomarkers in tissue samples, at sub-cellular resolution. It is interesting to note that, the firm’s spatial, single – cell and *in situ* solutions have been cited in over 3300 research papers. Also, the company’s solutions have been placed in more than 3500 top institutions. Further, the company has also been honored with the Scientist Top 10 Innovations award consecutively for five years.

**Table 5.2.1.1. Company B: Company Snapshot**

Particulars	Specifications
Headquarters	XX
Year of Establishment	XX
Number of Employees	XX
Executive Team Members	<ul style="list-style-type: none"><li>▪ <b>Candidate A:</b> Sample Text</li><li>▪ <b>Candidate B:</b> Sample Text</li><li>□ <b>Candidate C:</b> Sample Text</li><li>□ <b>Candidate D:</b> Sample Text</li><li>□ <b>Candidate E:</b> Sample Text</li><li>□ <b>Candidate F:</b> Sample Text</li></ul>





### 5.3.2 FINANCIAL INFORMATION

The financial year of Company B spans from January to December. The company’s revenues have increased at a CAGR of xx% from 2017 and 2021. In 2021, company reported total revenues worth USD xx million, representing an increase of xx% from the previous year’s performance (USD yyy million). The company believes that its instrument placements are important metrics to augment its business by enabling it to increase its clientele and providing insights into anticipated recurring revenue for consumables and instrument services.

### 5.3.3. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Table 5.24 provides information on various recent developments and strategies, that we believe, the company is likely to undertake in order to drive future growth.

**Table 5.24 Company B: Recent Developments and Future Outlook**

Strategic Initiatives	Recent / Past Trend(s)	Future Outlook
 Making Strategic Acquisitions to Expand Product Portfolio	<b>July 2017:</b> Sample Text	Sample Text
 Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
 Making Key Appointments to Strengthen Management Team	<b>March 2021:</b> Sample Text <b>July 2021:</b> Sample Text	Sample Text
 Strategic Initiative 4	<b>2019-2021:</b> Sample Text	Sample Text

## 5.4. COMPANY C

### 5.4.1. COMPANY OVERVIEW

Company C is a US-based firm offering spatial biology related solutions (*instruments, assays, software*), primarily to support researcher’s genomics, transcriptomics, and proteomics research. The company leverages its high-speed imaging instrument for visualizing and quantifying biomarkers in tissue samples at subcellular resolution.

**Table 5.4.1.1. Company B: Company Snapshot**

Particulars	Specifications
Headquarters	XX
Year of Establishment	XX
Number of Employees	XX
Executive Team Members	<ul style="list-style-type: none"> <li>▪ <b>Candidate A:</b> Sample Text</li> <li>▪ <b>Candidate B:</b> Sample Text</li> <li>□ <b>Candidate C:</b> Sample Text</li> <li>□ <b>Candidate D:</b> Sample Text</li> <li>□ <b>Candidate E:</b> Sample Text</li> <li>□ <b>Candidate F:</b> Sample Text</li> </ul>

### 5.4.2 FINANCIAL INFORMATION

The financial year of Company C spans from January to December. The company’s revenues have increased at a CAGR of xx% from 2019 and 2021. In 2021, Company C reported total revenues worth USD yyy million, representing an increase of xx% from the previous year’s performance (USD yyy million). The company believes that its instrument placements are important metrics to augment its business by enabling it to increase its clientele and providing insights into anticipated recurring revenue for consumables and instrument services.

### 5.4.3. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Table 5.3.3.1 provides information on various recent developments and strategies, that we believe, the company is likely to undertake in order to drive future growth.

**Table 5.3.3.1 Company C: Recent Developments and Future Outlook**

Strategic Initiatives	Recent / Past Trend(s)	Future Outlook
 Making Strategic Acquisitions to Expand Product Portfolio	<b>July 2017:</b> Sample Text	Sample Text
 Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
Strategic Initiatives	Recent / Past Trend(s)	Future Outlook



Making Key  
Appointments to

**March 2021:** Sample Text

Sample Text

Strengthen Management  
Team

**July 2021:** Sample Text



Strategic Initiative 4

**2019-2021:** Sample Text

Sample Text

## 5.5. COMPANY D

### 5.5.1. COMPANY OVERVIEW

Company D is a US-based firm, subsidiary of Company C, offering spatial biology related solutions (*instruments, assays, services*), primarily to support researchers in their biomedical discovery and research. The company leverages its proprietary ABC technology to accelerate spatial research by quantifying unlimited number of biomarkers in tissue samples at single-cell resolution. The company offers a broad range of multi – omics services. It also provides services for gene expression profiling, including Illumina RNA-Seq Assays, XXX Spatial Profiling and yy Assays. Further, the company being a CLIA-certified laboratory, provide support for preclinical and clinical trial studies by using techniques, such as IHC, FISH and histopathology.

**Table 5.5.1.1. Company D: Company Snapshot**

Particulars	Specifications
Headquarters	XX
Year of Establishment	XX
Number of Employees	XX
Executive Team Members	<ul style="list-style-type: none"> <li>▪ <b>Candidate A:</b> Sample Text</li> <li>▪ <b>Candidate B:</b> Sample Text</li> <li>□ <b>Candidate C:</b> Sample Text</li> <li>□ <b>Candidate D:</b> Sample Text</li> <li>□ <b>Candidate E:</b> Sample Text</li> <li>□ <b>Candidate F:</b> Sample Text</li> </ul>

### 5.5.2. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Table 5.5.2.1 provides information on various recent developments and strategies, that we believe, the company is likely to undertake in order to drive future growth.

**Table 5.5.2.1 Company B: Recent Developments and Future Outlook**

Strategic Initiatives	Recent / Past Trend(s)	Future Outlook
 Making Strategic Acquisitions to Expand Product Portfolio	<b>July 2017:</b> Sample Text	Sample Text
 Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
 Making Key Appointments to Strengthen Management Team	<b>March 2021:</b> Sample Text <b>July 2021:</b> Sample Text	Sample Text



Strategic Initiative 4

**2019-2021: Sample Text**

Sample Text

---



## 5.6. COMPANY E

### 5.6.1. COMPANY OVERVIEW

Company E is a US-based firm offering end-to-end spatial biology related solutions (*instruments, technologies, services*), primarily to support researchers understand biological systems that govern human health with spatial context. The company leverages its high-speed imaging technology to develop a spatial phenotyping platform for identification of RNA biomarkers in tissue samples, at sub-cellular resolutions. It is interesting to note that, the firm’s proprietary XXX technology has been featured in *Nature Methods* as “Method of the Year 2020: Spatially Resolved Transcriptomics.” Further, the company has also launched ABC Lab in order to fulfil the inflated demand of pharmaceutical companies who has shifted their focus towards single-cell and spatial transcriptomics solutions to quicken their drug development pipelines.

**Table 5.6.1.1. Company E: Company Snapshot**

Particulars	Specifications
Headquarters	XX
Year of Establishment	XX
Number of Employees	XX
Executive Team Members	<ul style="list-style-type: none"> <li>▪ <b>Candidate A:</b> Sample Text</li> <li>▪ <b>Candidate B:</b> Sample Text</li> <li>□ <b>Candidate C:</b> Sample Text</li> <li>□ <b>Candidate D:</b> Sample Text</li> <li>□ <b>Candidate E:</b> Sample Text</li> <li>□ <b>Candidate F:</b> Sample Text</li> </ul>

### 5.6.2. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Table 5.6.2.1 provides information on various recent developments and strategies, that we believe, the company is likely to undertake in order to drive future growth.

**Table 5.6.2.1 Company E: Recent Developments and Future Outlook**

Strategic Initiatives	Recent / Past Trend(s)	Future Outlook
 Making Strategic Acquisitions to Expand Product Portfolio	<b>July 2017:</b> Sample Text	Sample Text
 Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
 Making Key Appointments to Strengthen Management Team	<b>March 2021:</b> Sample Text <b>July 2021:</b> Sample Text	Sample Text



Strategic Initiative 4

**2019-2021: Sample Text**

Sample Text

---

## 5.7. COMPANY F

### 5.7.1. COMPANY OVERVIEW

Company F is a Europe-based firm offering spatial biology related solutions (*instruments, services*), primarily to support researchers in their single – cell spatial biology research. The company leverages its proprietary multiplexed, single-molecule detection technology to analyze spatial context of tissues at subcellular resolution. The company offers XX platform, that provides unprecedented sensitivity and specificity which is helpful in detecting transcripts individually. It is interesting to note that the platform has been used to understand molecular pathology behind SARS-CoV-2 infection recently Also, the platform has been featured by *The Scientist* among Top 10 Innovations of 2021. Further, the company has given the opportunity to utilize their platform before its commercial launch through an oversubscribed ABC program.

**Table 5.7.1.1. Company F: Company Snapshot**

Particulars	Specifications
<b>Headquarters</b>	XX
<b>Year of Establishment</b>	XX
<b>Number of Employees</b>	XX
<b>Executive Team Members</b>	<ul style="list-style-type: none"> <li>▪ <b>Candidate A:</b> Sample Text</li> <li>▪ <b>Candidate B:</b> Sample Text</li> <li>□ <b>Candidate C:</b> Sample Text</li> <li>□ <b>Candidate D:</b> Sample Text</li> <li>□ <b>Candidate E:</b> Sample Text</li> <li>□ <b>Candidate F:</b> Sample Text</li> </ul>

### 5.7.2. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Table 5.7.2.1 provides information on various recent developments and strategies, that we believe, the company is likely to undertake in order to drive future growth.

**Table 5.7.2.1 Company B: Recent Developments and Future Outlook**

Strategic Initiatives	Recent / Past Trend(s)	Future Outlook
 Making Strategic Acquisitions to Expand Product Portfolio	<b>July 2017:</b> Sample Text	Sample Text
 Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
 Making Key Appointments to Strengthen Management Team	<b>March 2021:</b> Sample Text <b>July 2021:</b> Sample Text	Sample Text

## 5.8 COMPANY G

### 5.8.1. COMPANY OVERVIEW

Company G is a Europe-based firm offering end to end spatial biology solutions (*instruments, software, services*), primarily to support researchers in their research from discovery to translational research. The company leverages its yy based technology called as abc technology to perform spatial proteomics and spatial genomics analysis. The company offers multifaceted spatial solutions for tissue profiling, biomarker discovery, multi-omic services and differential treatment. It is interesting to note that the company has been featured in the top 25 Swiss Scale-ups consecutively for two years. Further, Swiss Economic Forum has recognized Company G among top 3 young companies in XX.


**Table 5.8.1.1. Company G: Company Snapshot**

Particulars	Specifications
<b>Headquarters</b>	XX
<b>Year of Establishment</b>	XX
<b>Number of Employees</b>	XX
<b>Executive Team Members</b>	<ul style="list-style-type: none"> <li>▪ <b>Candidate A:</b> Sample Text</li> <li>▪ <b>Candidate B:</b> Sample Text</li> <li>□ <b>Candidate C:</b> Sample Text</li> <li>□ <b>Candidate D:</b> Sample Text</li> <li>□ <b>Candidate E:</b> Sample Text</li> <li>□ <b>Candidate F:</b> Sample Text</li> </ul>

### 5.8.2. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Table 5.8.2.1 provides information on various recent developments and strategies, that we believe, the company is likely to undertake in order to drive future growth.

**Table 5.8.2.1 Company G: Recent Developments and Future Outlook**

Strategic Initiatives	Recent / Past Trend(s)	Future Outlook
 Making Strategic Acquisitions to Expand Product Portfolio	<b>July 2017:</b> Sample Text	Sample Text
 Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
 Making Key Appointments to Strengthen Management Team	<b>March 2021:</b> Sample Text <b>July 2021:</b> Sample Text	Sample Text



Strategic Initiative 4

**2019-2021: Sample Text**

Sample Text

---

## 5.9 COMPANY H

### 5.9.1. COMPANY OVERVIEW

Company H is a Europe-based firm offering spatial biology related solutions, primarily to support researchers in their single – cell spatial omics research. The company leverages its ability to micro manipulate, micro dissect tissue samples and image them with high precision using company’s xx tools software. The company has designed their instruments in such a way that they all can be combined as well simultaneously on a single microscope system. Further, the company has an extensive distribution network across globe. In fact, the company has installed more than 350 manipulation systems worldwide.




**Table 5.9.1.1. Company H: Company Snapshot**

Particulars	Specifications
<b>Headquarters</b>	XX
<b>Year of Establishment</b>	XX
<b>Number of Employees</b>	XX
<b>Executive Team Members</b>	<ul style="list-style-type: none"> <li>▪ <b>Candidate A:</b> Sample Text</li> <li>▪ <b>Candidate B:</b> Sample Text</li> <li>□ <b>Candidate C:</b> Sample Text</li> <li>□ <b>Candidate D:</b> Sample Text</li> <li>□ <b>Candidate E:</b> Sample Text</li> <li>□ <b>Candidate F:</b> Sample Text</li> </ul>

### 5.9.2. RECENT DEVELOPMENTS AND FUTURE OUTLOOK

Table 5.9.2.1 provides information on various recent developments and strategies, that we believe, the company is likely to undertake in order to drive future growth.

**Table 5.9.2.1 Company H: Recent Developments and Future Outlook**

Strategic Initiatives	Recent / Past Trend(s)	Future Outlook
 Making Strategic Acquisitions to Expand Product Portfolio	<b>July 2017:</b> Sample Text	Sample Text
 Participating in Conferences and Other Events to Enhance Company Visibility	<b>October 2020:</b> Sample Text <b>June 2021:</b> Sample Text	Sample Text
 Making Key Appointments to Strengthen Management Team	<b>March 2021:</b> Sample Text <b>July 2021:</b> Sample Text	Sample Text
 Strategic Initiative 4	<b>2019-2021:</b> Sample Text	Sample Text

## **PROJECT LEARNING OUTCOMES**

During this project, the foremost thing I learned is to work in disciplined work environment and set short-term and long-term goals to complete the assigned tasks. In addition, with weekly / daily project goals to complete various modules, I acquired the skill of working in an organized and structured manner. The project progress was discussed regularly in weekly project meetings. In addition, plans for the coming week were also outlined. This in turn, cultivated and created a mindset where I was able to focus my mind and energies on the goal and persevere until they were accomplished.

The in-depth research I have done here and the exposure to various potential topics in the healthcare industry has resulted in an increase in my subject knowledge. I can analyze and interpret data in a more productive and meaningful manner now. In addition, I learned the evaluation criteria and the methodology to conduct extensive secondary research for the selection of potential project topics. This in turn has enhanced my research skills a lot and will certainly help me during the upcoming capstone project as well as my college semester. In addition, I got an opportunity to assist my manger in various other project topics, which helped me to enhance my subject knowledge and understand the challenges that vary on project-to-project basis.

The various detailed / extensive analysis we have conducted on the collected data to highlight market trends, leading industry players, existing market landscape and its growing nature has enhanced my analytical skills a lot. With this skill, I will be able to detect patterns, brainstorm, observe, interpret data, and make decisions based on multiple factors available in everyday work.

Moreover, the exposure to industry stakeholders during project calls and interviews has also to enhance my skills and confidence. Therefore, by using these skills and an improved way of presenting data in terms of insightful and structural output, I will be able to present my points in a more effective and constructive manner wherever needed. In addition, I have learned the art of professional writing along with a hands-on experience with Microsoft tools such as (excel, power point and word) which will for certainly serve as key skill sets and assist me in my future endeavors.



## REFERENCES

- [1] A. Philippidis. “Top 10 Spatial Biology Companies.” <https://www.genengnews.com/topics/omics/top-10-spatial-biology-companies/>(Accessed March 5, 2022).
- [2] Akoya Biosciences, “Why Spatial Biology.” <https://www.akoyabio.com/why-spatial-biology/>(Accessed March 7, 2022).
- [3] A. Philippidis. “Top 10 Spatial Biology Companies.” <https://www.genengnews.com/topics/omics/top-10-spatial-biology-companies/>(Accessed March 5, 2022).
- [4] G. Emanuel. “Spatial Biology Technologies in the Lab of the Future.” <https://www.technologynetworks.com/cell-science/articles/spatial-biology-technologies-in-the-lab-of-the-future-358128>(Accessed April 10, 2022).
- [5] G. Emanuel. “Spatial Biology Technologies in the Lab of the Future.” <https://www.technologynetworks.com/cell-science/articles/spatial-biology-technologies-in-the-lab-of-the-future-358128>(Accessed April 10, 2022).
- [6] Resolve Biosciences. “Getting Started in Spatial Biology: What You Need to Know.” <https://www.genomeweb.com/applied-markets/getting-started-spatial-biology-what-you-need-know>(Accessed May 4, 2022).
- [7] Teledyne Photometrics. “What Is Live Cell Imaging?” <https://www.photometrics.com/applications/live-cell/what-is-live-cell-imaging>(Accessed May 10, 2022).
- [8] E. Jensen, “Overview of Live-Cell Imaging: Requirements and Methods Used,” *American Association for Anatomy*, vol 296, no. 1, pp. 1-8, August 21, 2012.
- [9] E. Jensen, “Overview of Live-Cell Imaging: Requirements and Methods Used,” *American Association for Anatomy*, vol 296, no. 1, pp. 1-8, August 21, 2012.

