



شركة وادي الرياض
Riyadh Valley Co

Medical Devices – Clinical Electronic Microscopes



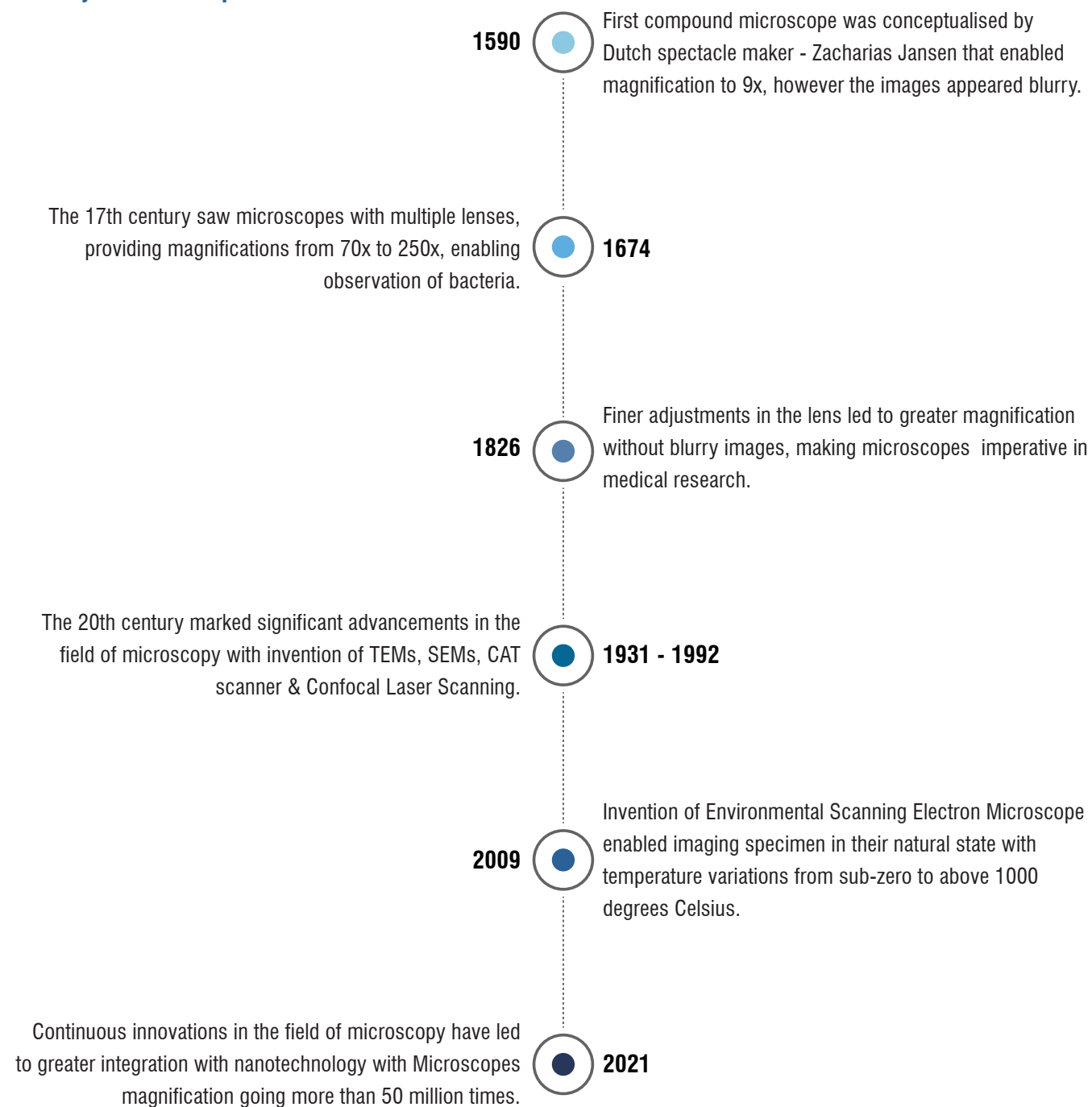
December 2021

Historical Background about Microscopes

What is a Microscope?

A laboratory instrument that facilitates observation of objects at cellular level through its lenses that adjust how light enters the naked eye. With technological innovations over centuries, the number of lenses in a microscope increased, simple light microscopes evolved to compound electron microscopes, making clinical microscopy an indispensable tool for diagnosis and screening.

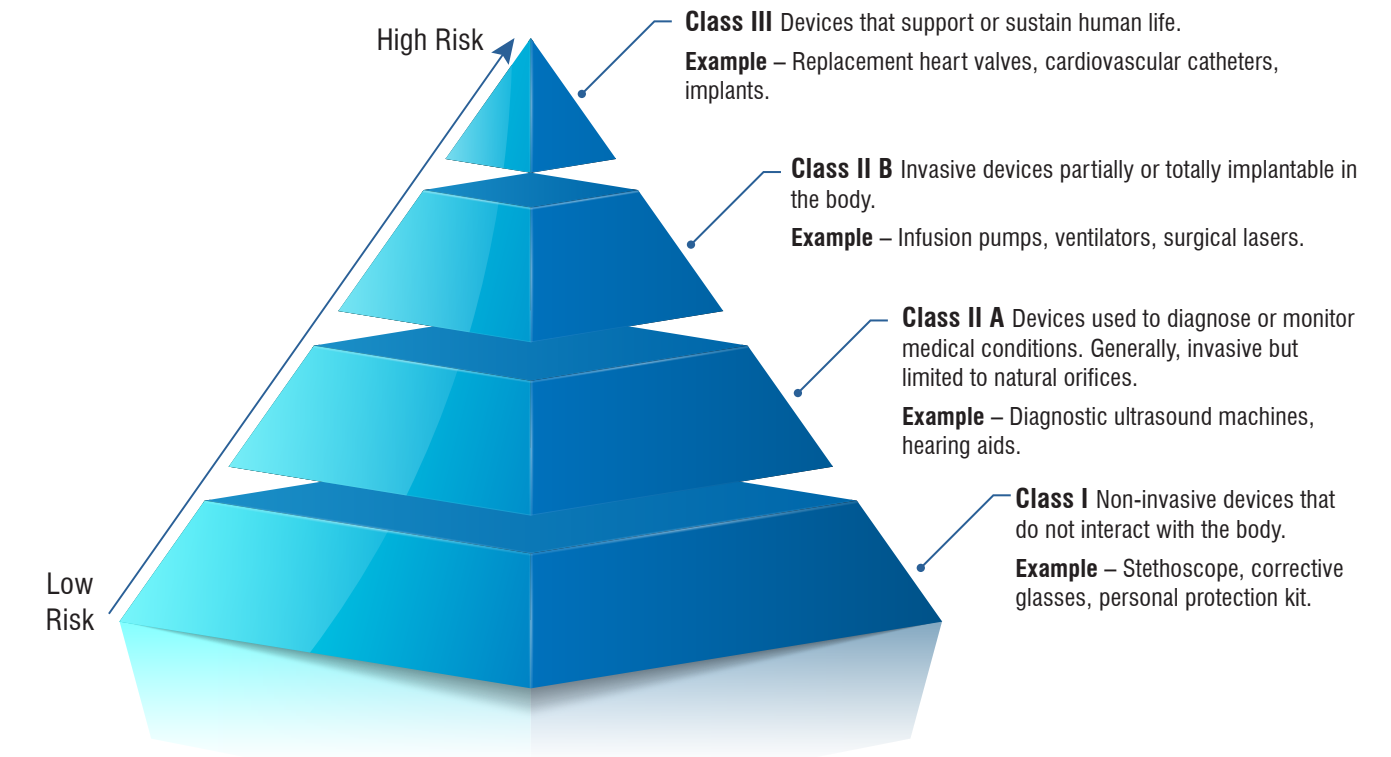
History of Microscopes



Source: Marmore Research

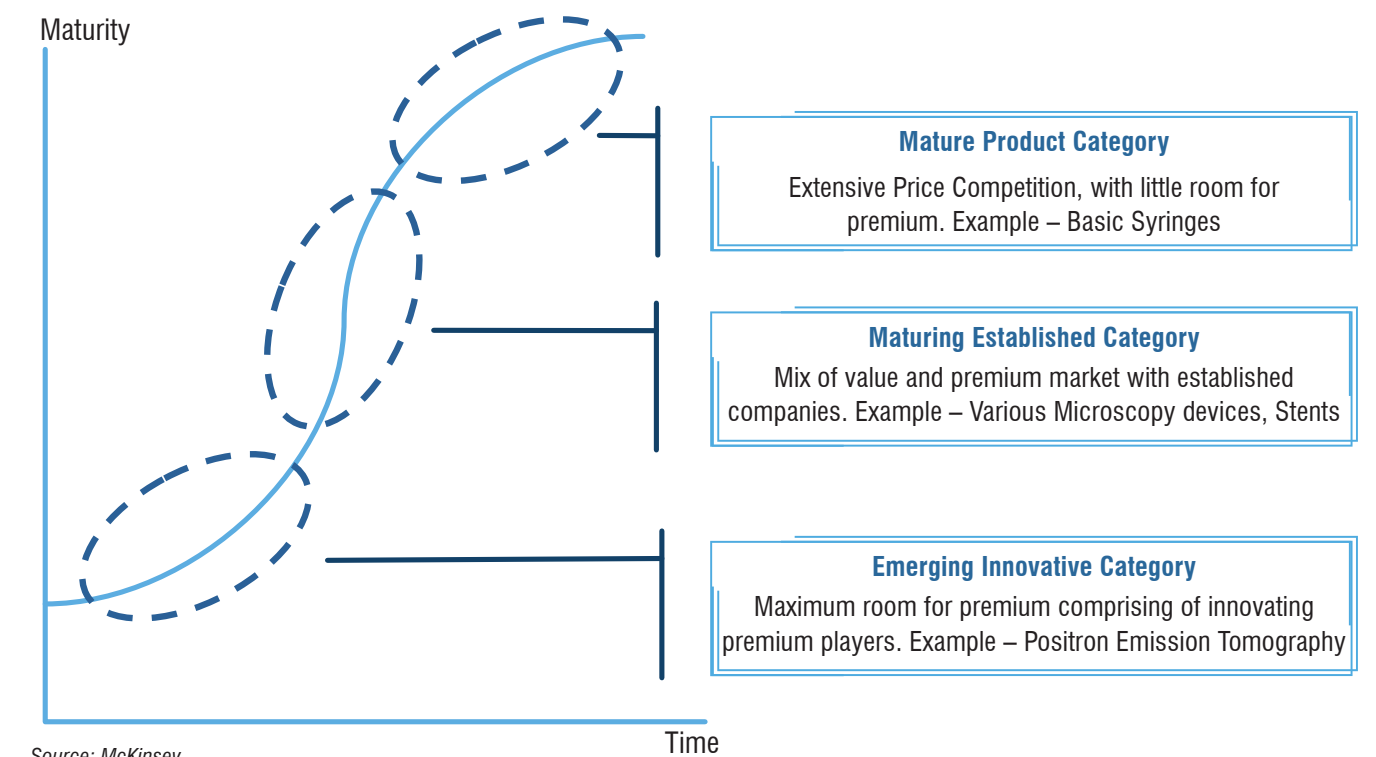
Microscopic Market Overview

Segmentation of Medical Device industry



Source: European Commission

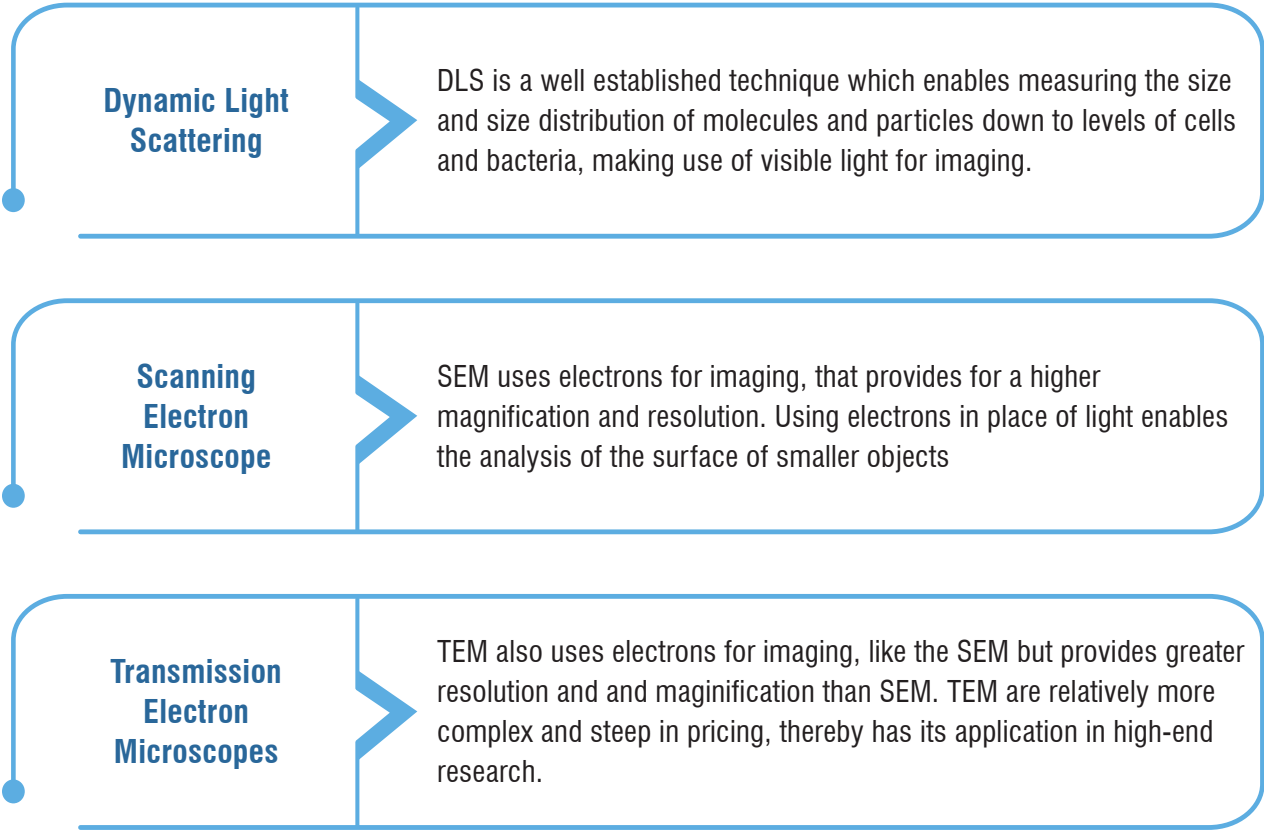
Segmentation on Maturity of Medical Devices Product Category



Source: McKinsey

Nanoparticle analysis is conducted using different types of equipment depending upon the research requirements including resolution, nominal acceleration and magnification.

Brief description of major types of Microscopes used for nanoparticle analysis



Source: Vironova

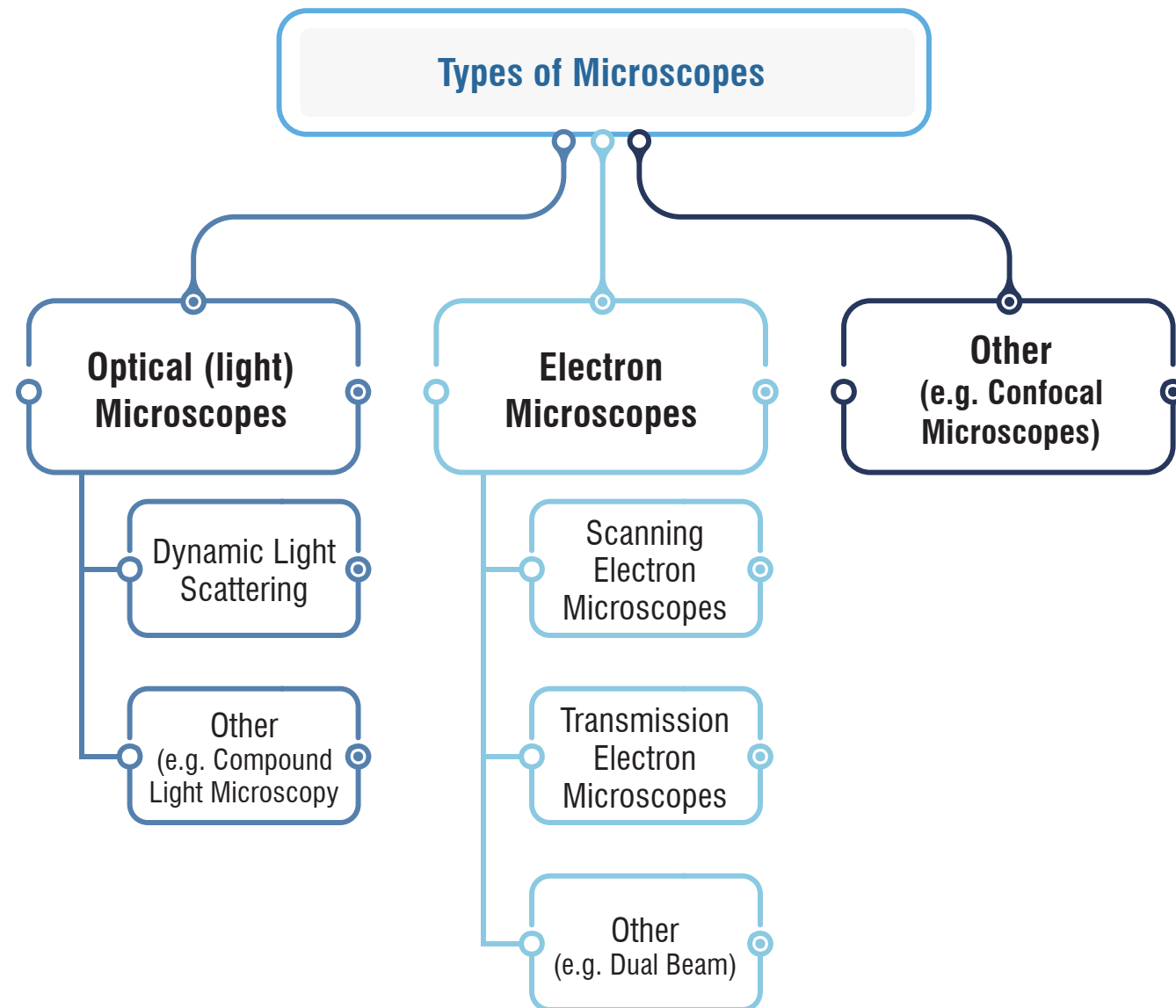
Key Differences between DLS, SEMs & TEMs

| | Dynamic Light Scattering | Scanning Electron Microscope | Transmission Electron Microscope |
|---------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Description | DLS measures changes in the light intensity scattered from the suspension or emulsion | SEMs make use of high resolution scattered electron beams to analyse the micro/nano structure of pharmaceuticals and chemicals | TEMs make use of high resolution transmitted electron beams to analyse the micro/nano structure of pharmaceuticals and chemicals |
| Requirements | Requires vacuum for operation | SEMs and TEMs do not require vacuum for operation | |
| Magnification | No Magnification | Up to ~ 2-3 million times | More than 50 million times |
| Resolution | Down to 0.2 μm | Down to ~ 0.5nm | Down to <50pm |
| Image Display | No Image | 3D Images | 2D Images |
| Analysis Time | 5-10 Minutes | Several hours with analysis of large amount of data | Several hours with analysis of small amount of data |
| Operation | - | Easy to use with no sample preparations | Trained users required with laborious sample preparation |
| Application | Down to cells of cells and bacteria | Down to macromolecule and atom level | Down to macromolecule and atom level |

Source: KPMG, Lansdowne & Company

(1): 1 pm=0.001 nm

Different types of Microscopes used for nanoparticle analysis

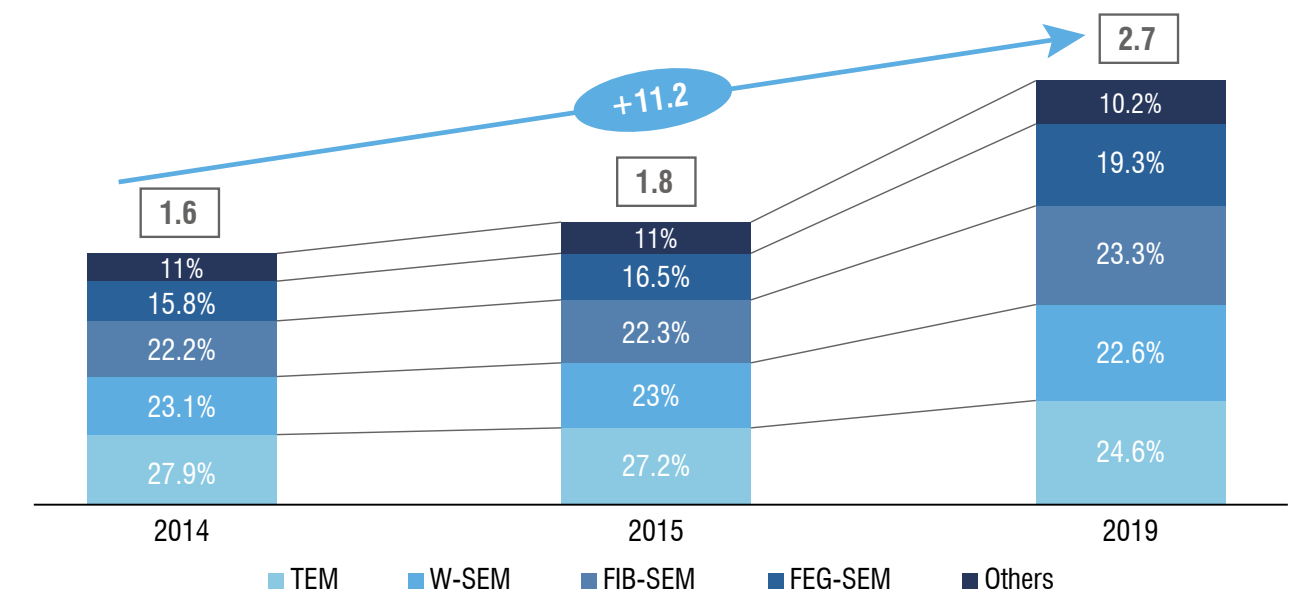


Source: Vironova

Global market trends: Electron Microscopy and Nano particle analysis

The Electron microscopy market is estimated to have grown at a CAGR of 11.2%, from USD 1.6 billion in 2014 to USD 2.7 billion in 2019.

Electron microscopy market by type, in USD billion

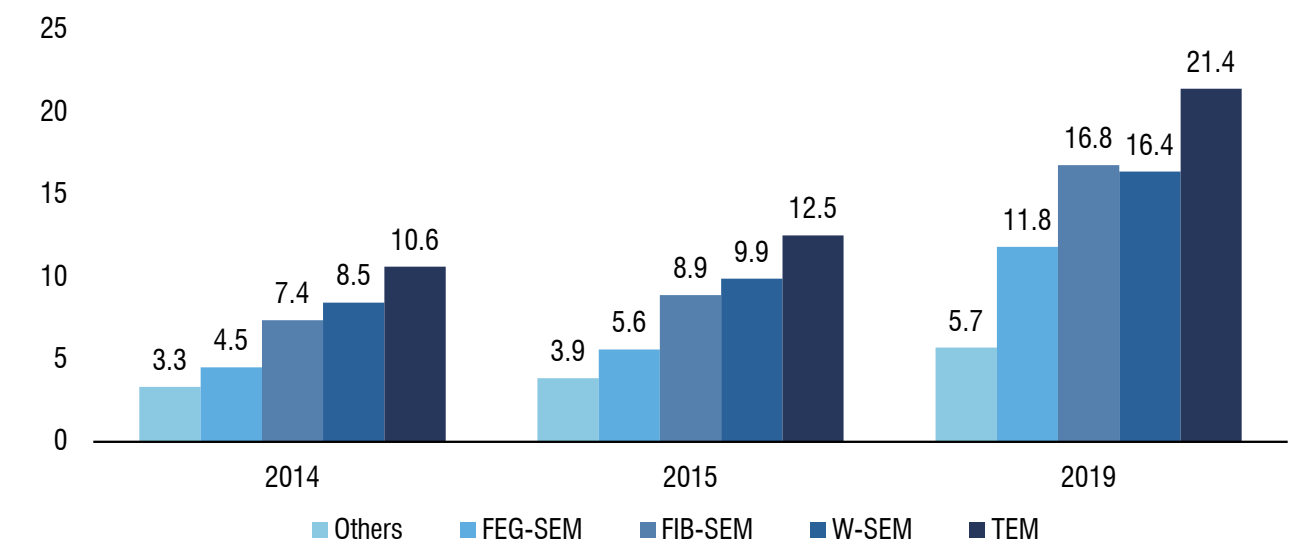


Source: Markets & Markets, Lansdowne & Company

W-SEM: Tungsten Filament Scanning Electron Microscope; FIB-SEM: Focussed Ion Beam Scanning Electron Microscope; FEG-SEM: Field Emission Gun Scanning Electron Microscope

TEMs have the largest market share, estimated to hold almost 24.6% of the total microscopy market. TEM sales are estimated to have increased by 71% to 21,424 in 2019.

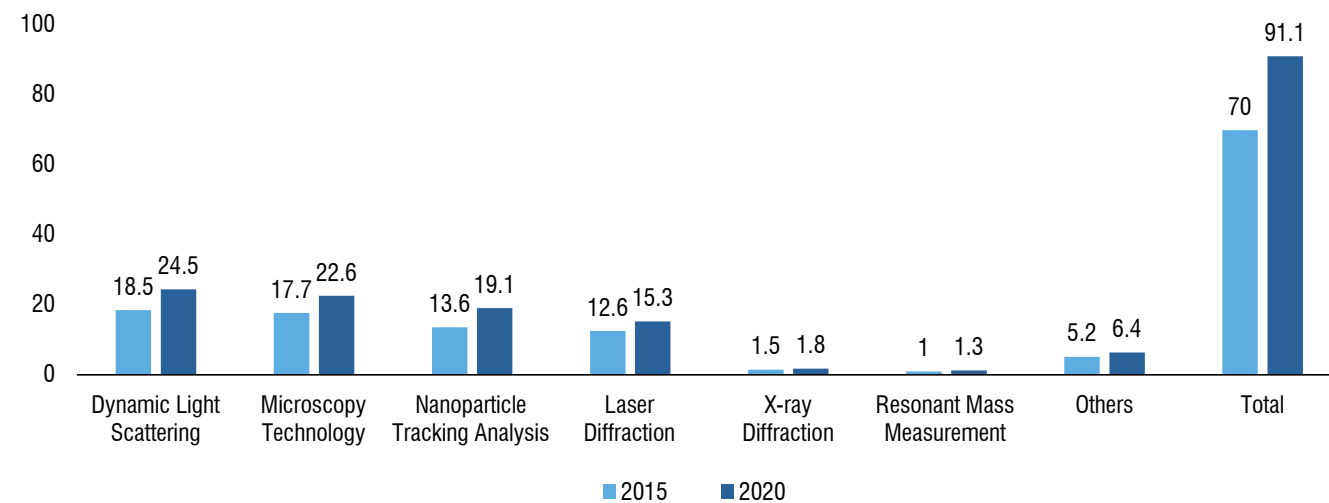
Sales of Electron microscopy market by type, in thousand units



Source: Markets & Markets, Lansdowne & Company

The global nanoparticle analysis market is estimated to have grown at a CAGR of 5.5% between 2015 and 2020, on the back of its use for drug development. Although DLS dominates the market share, the fastest growing segment within the industry is the nanoparticle tracking analysis, which is estimated to have grown at a CAGR of 40% to 91.1 million in 2020.

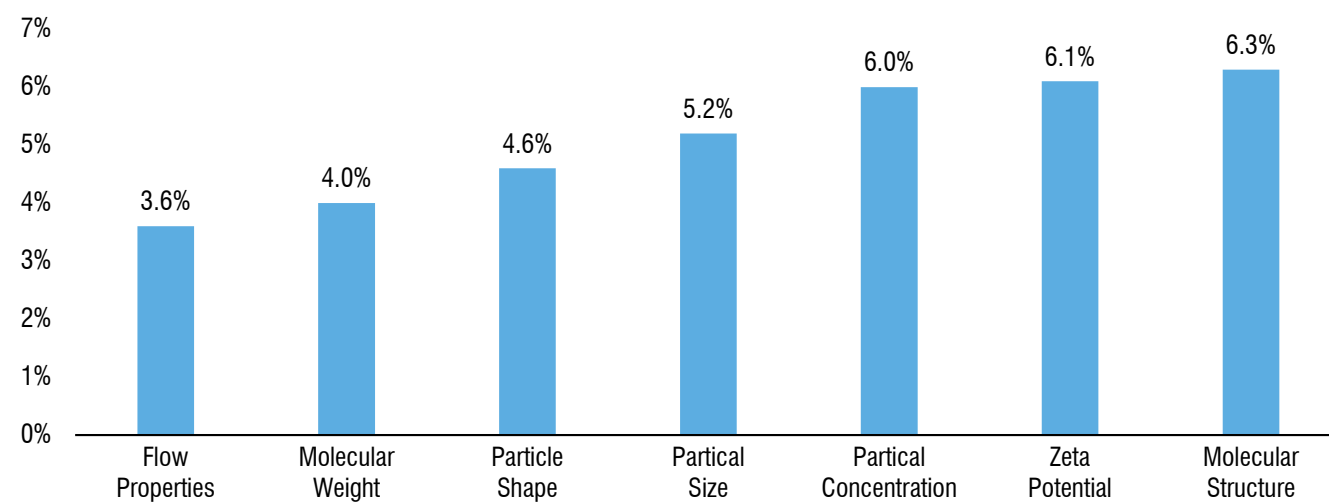
Global Nanoparticle analysis market share by type 2015 vs 2020, in USD million



Source: Markets & Markets, Lansdowne & Company

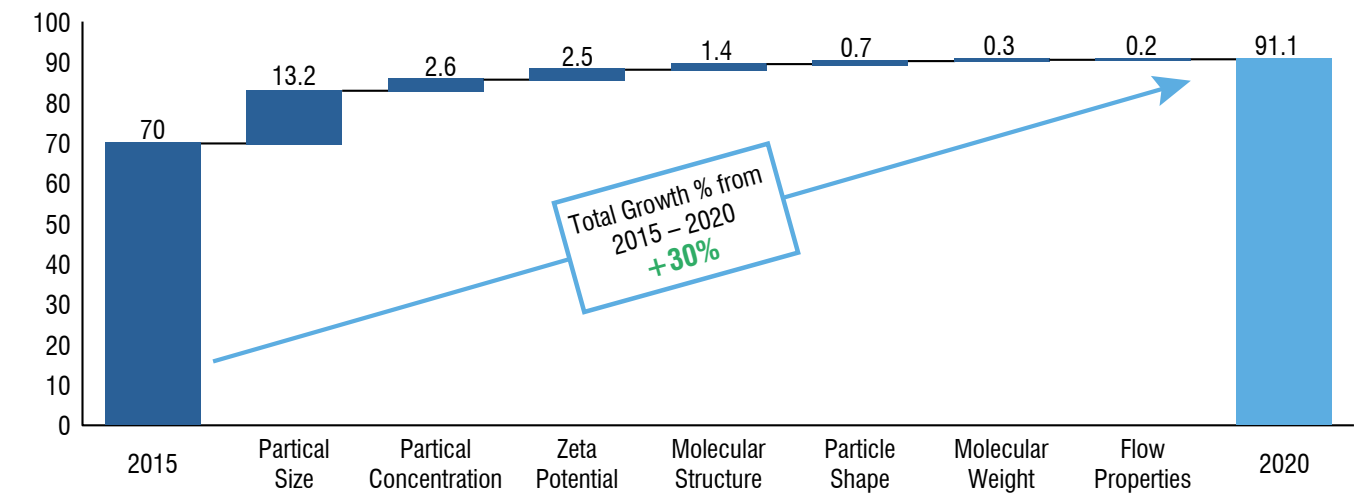
Particle size segment is estimated to have the largest size growth between 2015 and 2020 of USD 13.2 million, whereas Molecular structure analysis segment is estimated to be the fastest growing segment with a CAGR of 6.3% from 2015 to 2020.

Growth % in Nanoparticle analysis market between 2015 & 2020



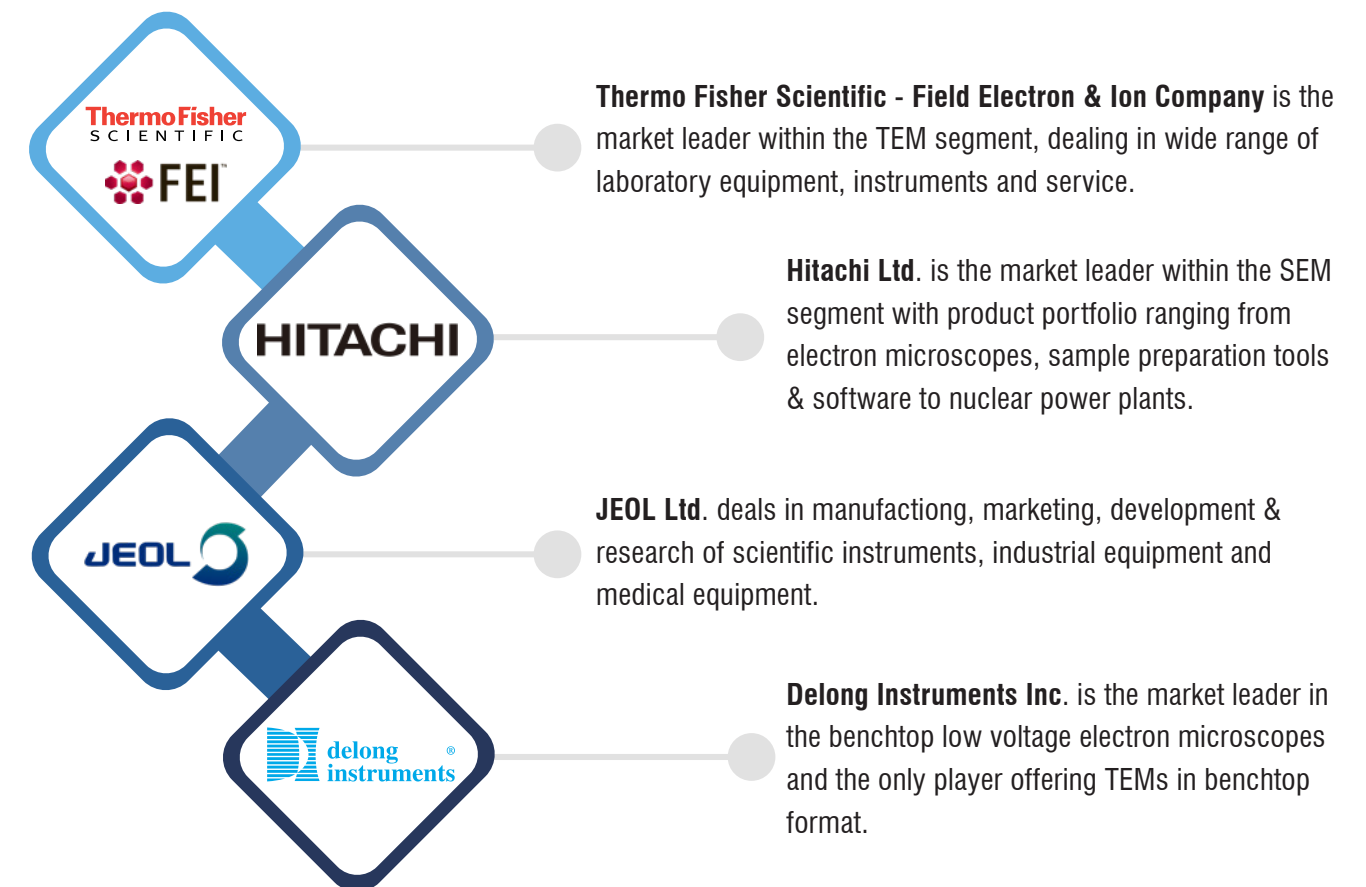
Source: Markets & Markets, Lansdowne & Company

Growth in Nanoparticle analysis market between 2015 & 2020, in USD million



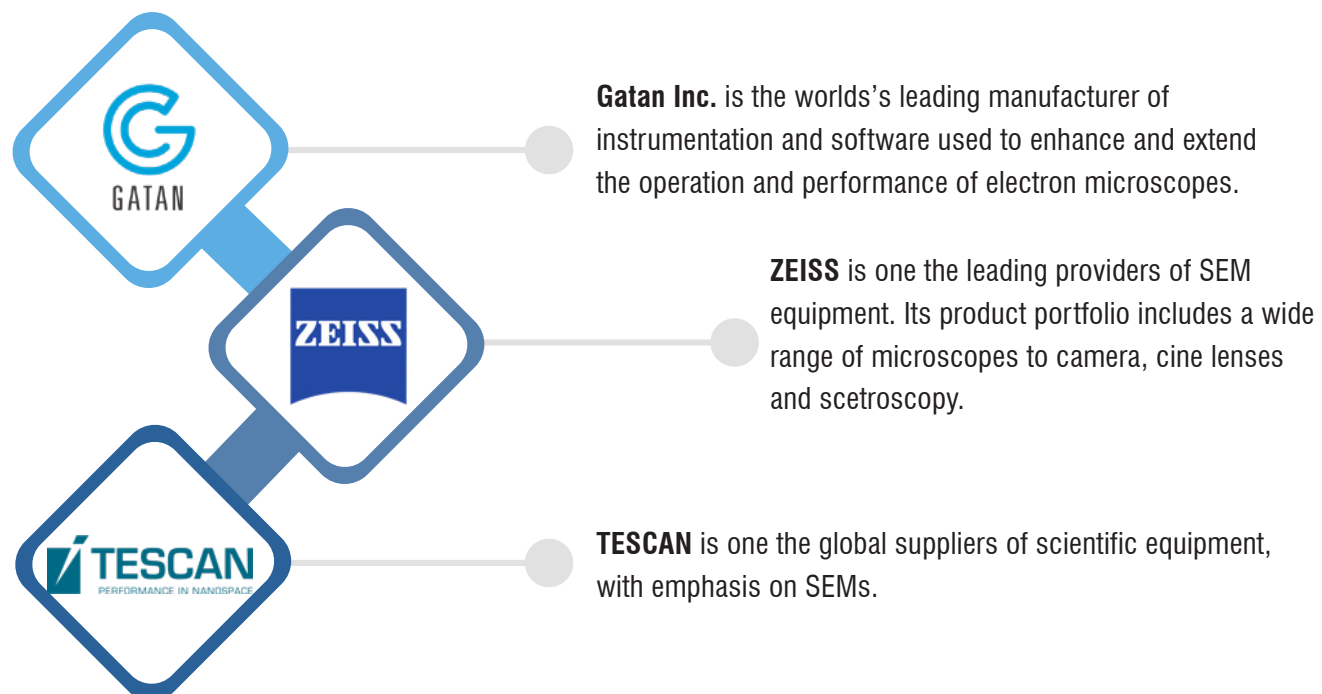
Source: Markets & Markets, Lansdowne & Company

Major Market Players in TEM Segment



Source: KPMG, Lansdowne & Company

Other Major Market Players in the Segment

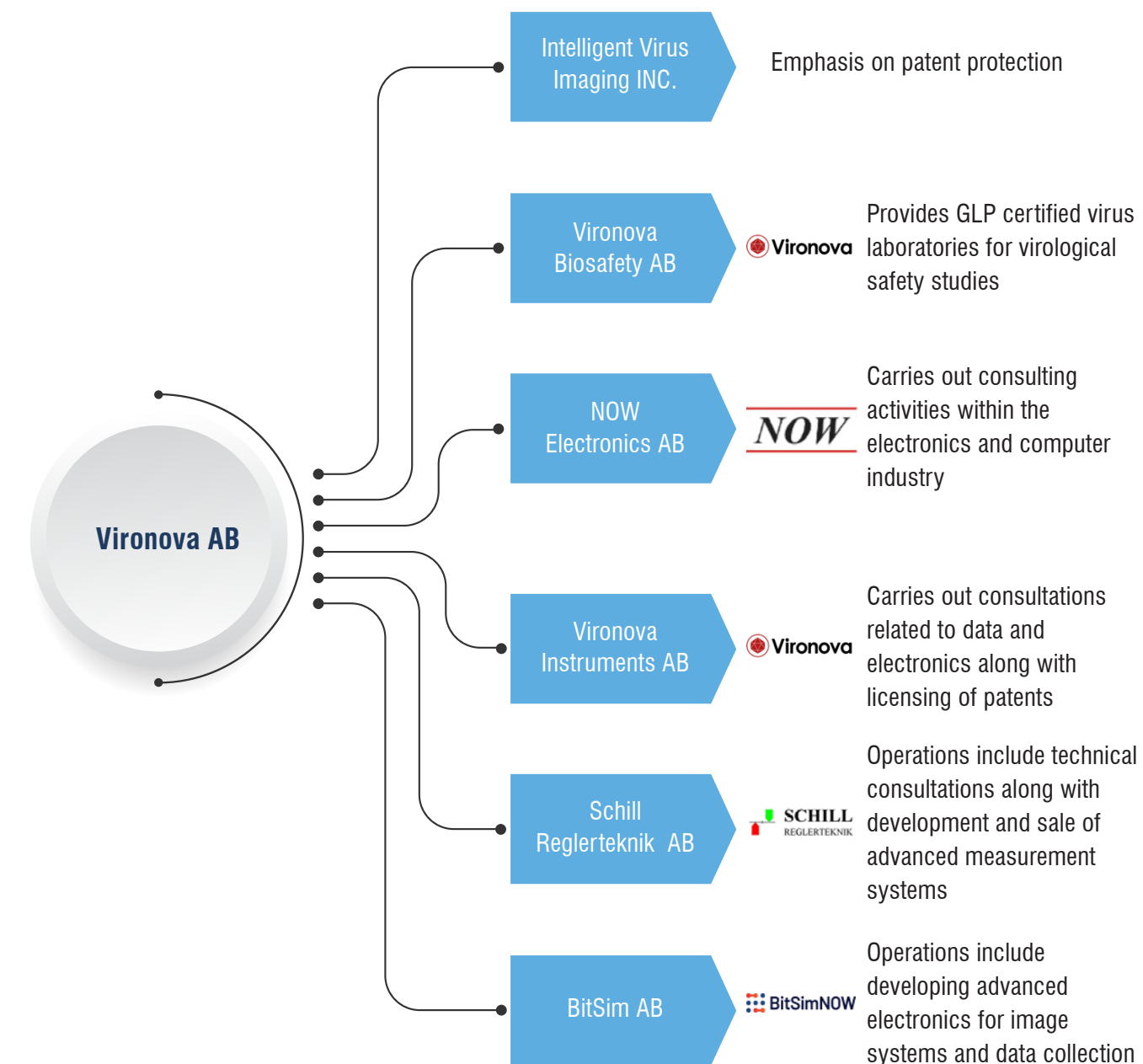


Source: KPMG, Lansdowne & Company

Overview of Vironova Vironova

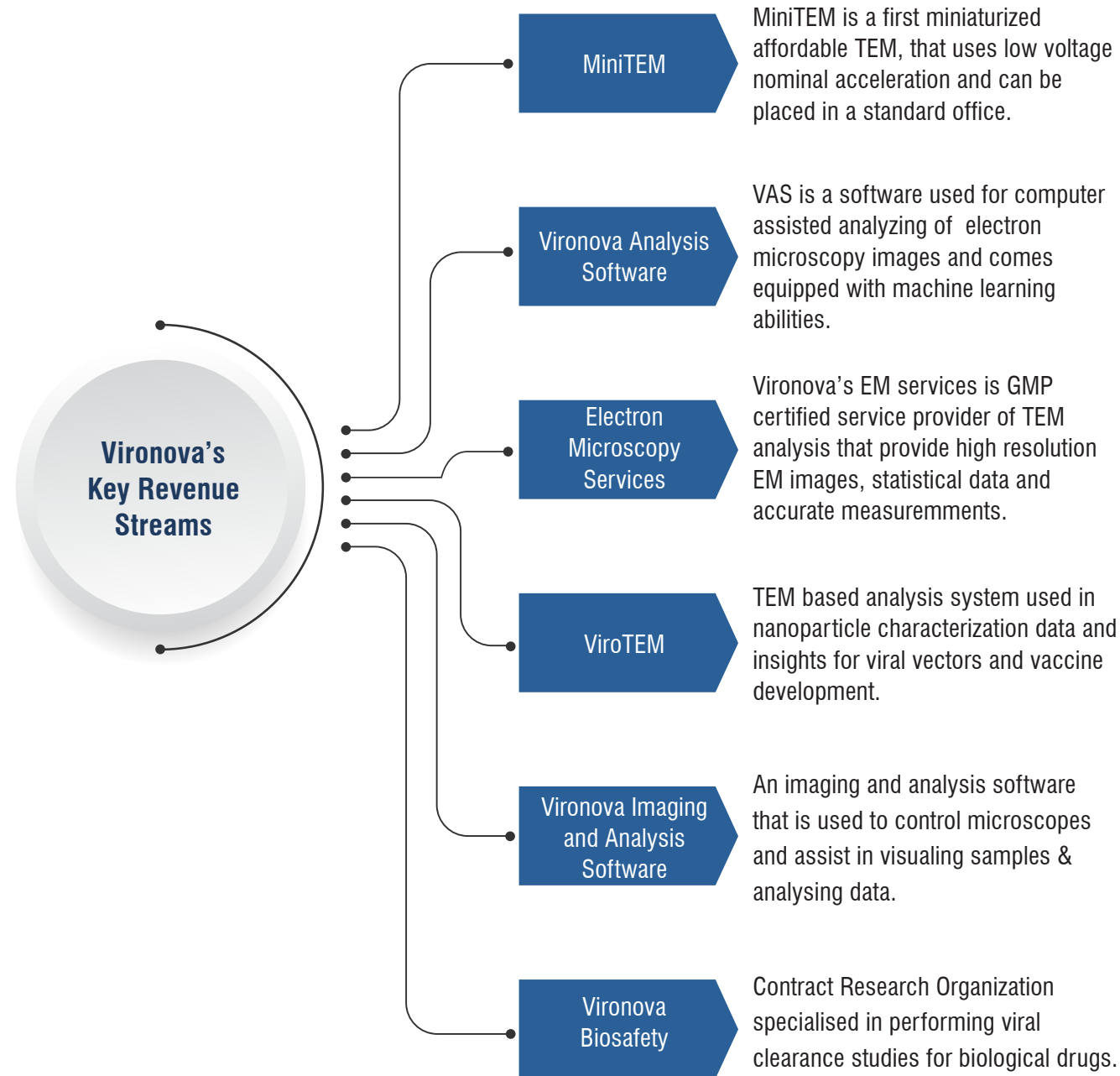
Vironova was founded in Stockholm (Sweden) as a service provider in the field of nanoparticle analysis industry. Vironova is one of Riyadh Valley Company investment portfolio companies. Today, Vironova is a world leading partner to the global life science community, that operates via its 6 wholly owned subsidiaries providing an integrated value chain comprising of hardware, software and services for advanced electron microscopy analysis.

Vironova Company Structure



Source: Vironova

Vironova's Key Business Lines



Source: Vironova

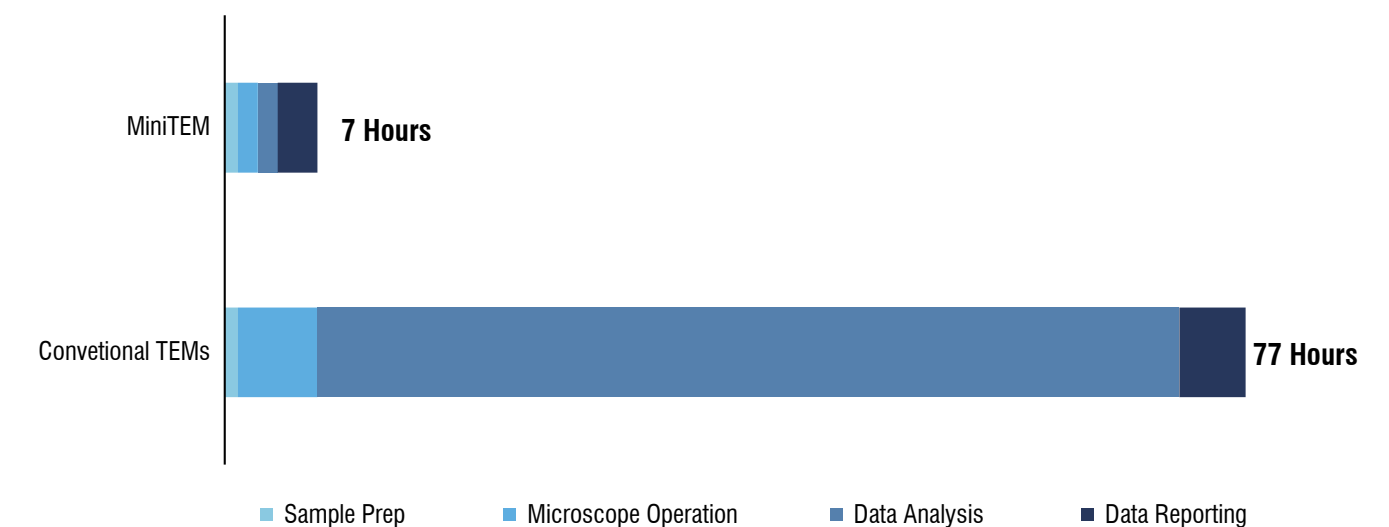
MiniTEM is a desktop sized microscope that simplifies the use of a traditional TEM. It automatically images, detects and analyses particles with defined morphological characteristics and transforms the data into accurate metrics. MiniTEM delivers results of the analysis quicker than a traditional TEM, and requires minimal operator training.

Difference between TEMs and MiniTEM

| | Transmission Electron Microscope | Vironova's MiniTEM |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Description | TEMs make use of high resolution transmitted electron beams to analyse the micro/nano structure of pharmaceuticals and chemicals | Similar to TEMs but does not require extra space and infrastructure |
| Complexity | Complex | Simple |
| Analysis Time | Several hours with analysis of small amount of data | A few minutes |
| Operation | Trained users required with laborious sample preparation | No programming skills required |

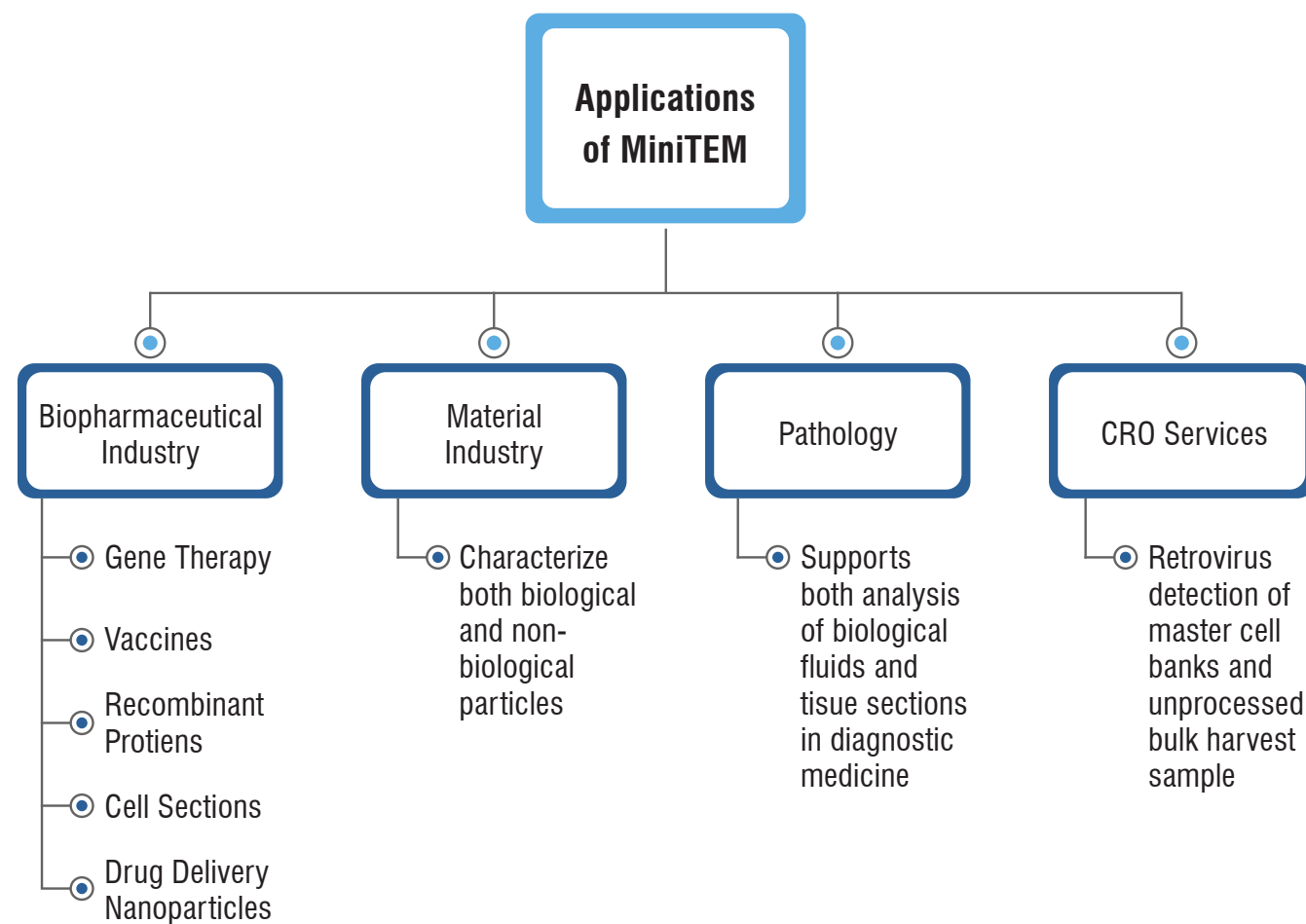
Source: Vironova

Estimated Duration of Analysis (TEMs vs MiniTEM)



Source: Vironova

Applications of MiniTEM



Source: Vironova

Medical equipment markets in Saudi Arabia

Medical equipment market in Saudi Arabia is estimated to be at USD 2 billion and is expected to grow annually at 10%. Presently, imports account for over 95% of the market¹.

Saudi Arabia has been encouraging domestic manufacturing in low-value products such as bandages, gloves, syringes and single-use devices made out of plastic.

Saudi Arabia has opportunities to capitalize on its existing industrial ecosystem and expand its presence in manufacturing of medical equipment's in the below categories:

- Emergency room equipment,
- Rehabilitation equipment,
- Diagnostic equipment,
- Electro-medical Equipment,
- Orthopaedic equipment,
- Dental appliances,
- Glucometers and Implants.

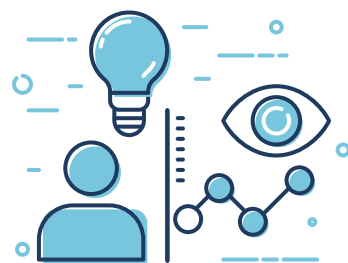
National Unified Company for Medical Supplies (NUPCO) is responsible for centralized procurement, warehousing, distribution, and re-exporting of pharmaceuticals, medical equipment and supplies for all public hospitals and healthcare facilities. Private sector participation is on a rise, with the number of private hospitals growing at 2.9%. Vision 2030 provides private players in the market a great opportunity to foster and grow the country's healthcare sector.

¹ International Trade Administration, US

References

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3. Microscope LLC, History of Microscopes
<https://www.microscope.com/education-center/microscopes-101/history-of-microscopes>
4. Microscope Master, History of the Microscope
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5. Vironova
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Vision

To be the regional leader in knowledge-based investment and technology.



Mission

Riyadh Valley Company is a strategic investor, focused on leveraging the local capabilities, investing locally and globally in growth - stage businesses to create financial and strategic returns that will support the future of economic development in the Kingdom.

Investment Sectors:



Knowledge Investments



Healthcare investment



Renewable energy& sustainable resources



Information & Communication technology



Real Estate Investments



Innovation and R&D Projects



Educational Projects



Healthcare Projects



Commercial Projects

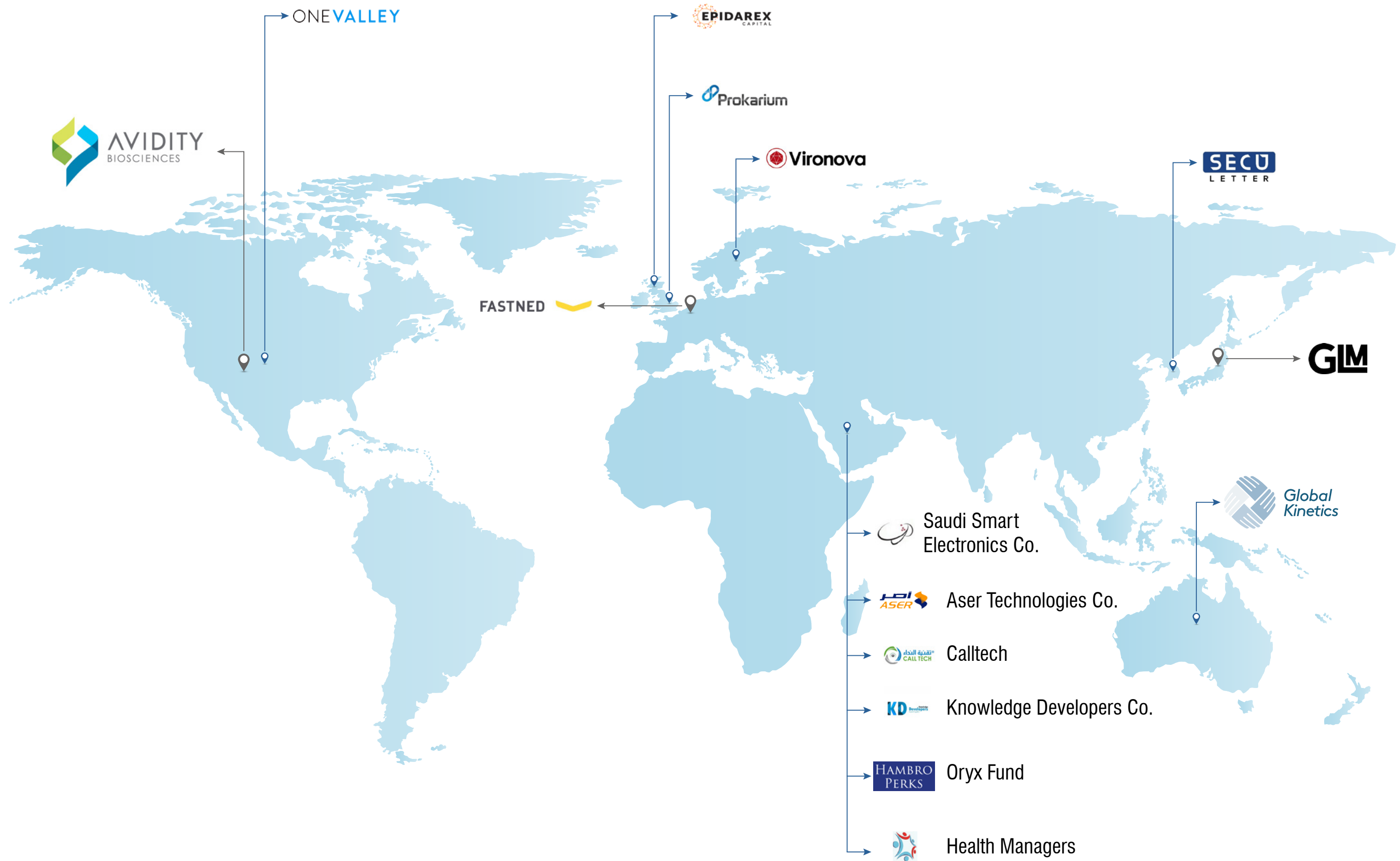


Residential Projects



Mixed-use Projects

Knowledge Investment Portfolio



Real Estates Investment portfolio



Sudair Pharma Company Project

Research center and company offices for Sudair Pharma Company



ELM Information Security Company Project

Innovation Center project for Elm information security company



Four Directions Company Project

Commercial and office project contains office buildings and multi-use halls



Retail Real Estate Company Project

Social-Entertaining and sports project



Derma Clinic Company Project (Residential)

Residential project for Derma Medical Clinics



City Lights Real Estate Company Project

Entertainment-Commercial project contains screens on the building and architectural blocks, in addition to areas for live shows



NMR Real Estate Company Project

Mixed-use project includes a hotel, restaurants and cafes



Al-soroo Al-Mubarakah Company Project

Mixed-use project contains office complex, Mall, Restaurants, cafes, and walkway for visitors



Obeikan Company Project

Commercial project contains various stores near the Common First Year building



Four Directions Company Project

Residential & commercial project



Derma Clinic Company Project

Medical-Commercial project contains several medical clinics, medical products stores, and pharmacies



Dur Alkuttab Company Project

Educational project for Primary Schools



Arrowad For Higher Education Company Project

Educational complex, Arrowad colleges University campus in Riyadh



Omnia Real Estate Development Company Project

Commercial project contains various shops



Unified Real Estate Development Project

Cultural-Entertainment project that includes Luxury restaurants, Cafes, Cinemas and green spaces



University Boulevard

Commercial-Entertainment project gives visitors a different experience, and it includes Restaurants and cafes



Sahat Al-Ardh Company Project

A commercial project contains various shops



Majd Real Estate Project

Office-space project



Riyadh Valley Company

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Riyadh Valley Company (RVC)