

CRISPR PATENT LANDSCAPE

January 2016



IPStudies

Intangible assets deserve closer scrutiny

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Our team



Corinne LE BUHAN, PhD

ICT Expert

IP Strategy & Management

- Funded IPStudies in 2010 to help Swiss & EU high-tech SMEs develop and execute their IP valuation plans using the latest patent analytics tools and trends
- 15 years experience in IP strategy and management – former VP Knowledge Management of NagraVision-Kudelski Group, in charge with patents (200 families), standards, R&D collaborations, licensing and technical publications portfolios
- Teaches international licensing practices and IP strategy at IEEPI – EU Horizon2020 expert on Innovation in SMEs 2013-2015
- ICT Technology Expert for various licensing facilitators and aggregators in France, Germany and the US
- University postgraduate in management of innovation and intellectual property (University of Strasbourg, 2008), PhD in Communications Science (EPFL, 1998), MSc in Electrical Engineering (INSA Rennes, 1994)
- Experienced with Patbase, EPO/RegisterPlus, USPTO/PAIR
- International network of IP practitioners and licensing managers - Member LES, IEEE, AROPI, AAIEEPI



Fabien PALAZZOLI, PhD

Life Sciences Expert

Patent Analysis & Landscapes

- Joined IPStudies in 2013 to develop the IP analytics offering in life sciences & biotechnology
- 9+ years experience in technology transfers, patent mapping/landscaping and FTO-driven research intelligence for the French public sector and biotech SMEs - former IP analytics sales manager for FIST SA, the CNRS technology transfer office
- Author/co-author of 18 scientific and technical publications/communications, as well as one book chapter
- Life sciences patent analyst for various biotech/medtech SMEs in Switzerland and in Europe
- PhD in Life Sciences (Exploitation of patent information in a public research laboratory: identification of technological niches in bioproduction and gene therapy, University of Tours, 2011), MSc in Biotechnology and Law (University of Tours, 2007)
- Experienced with Orbit, Patbase, Intellixir, patent offices databases
- International network of patent information analysts

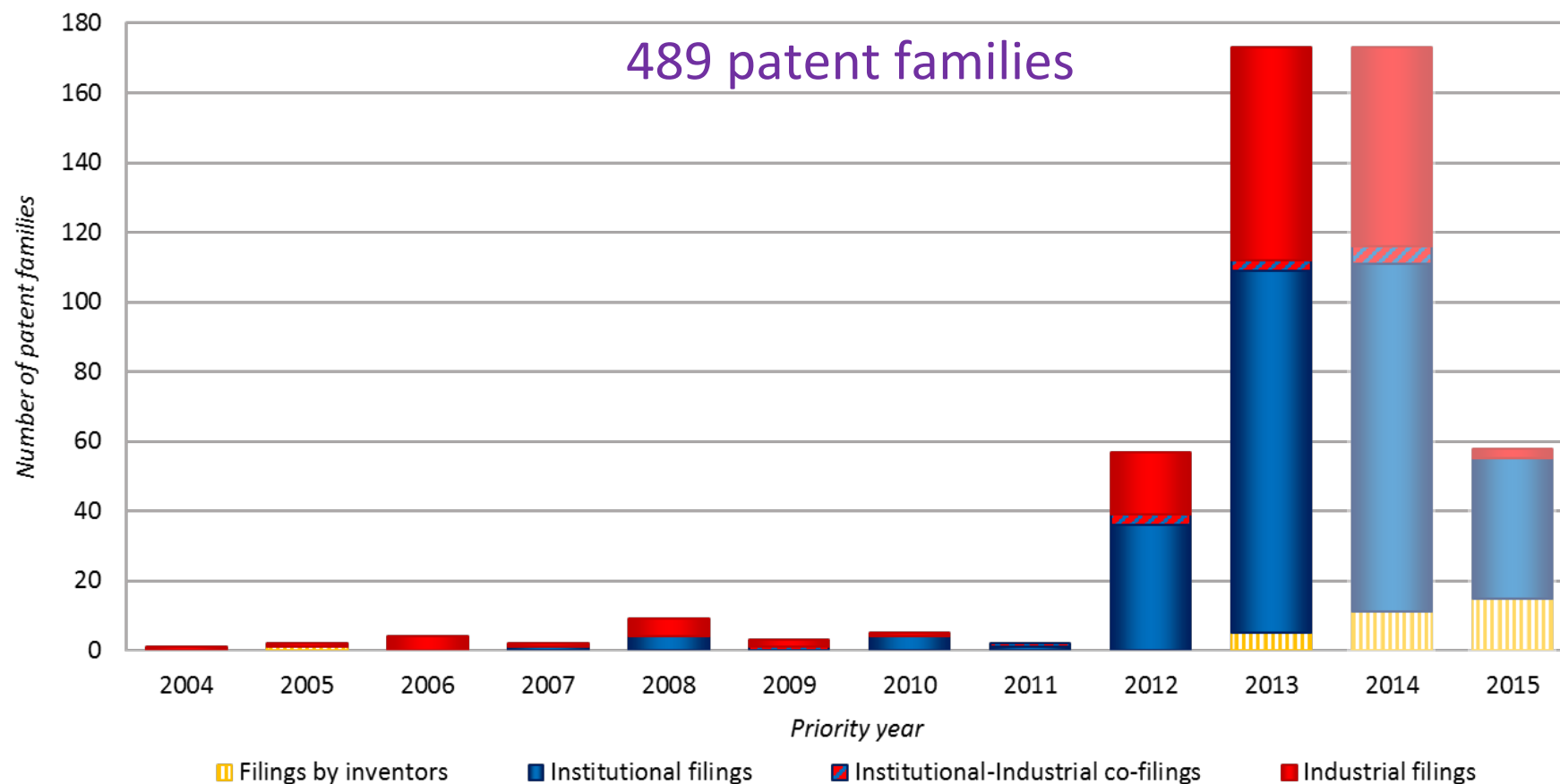


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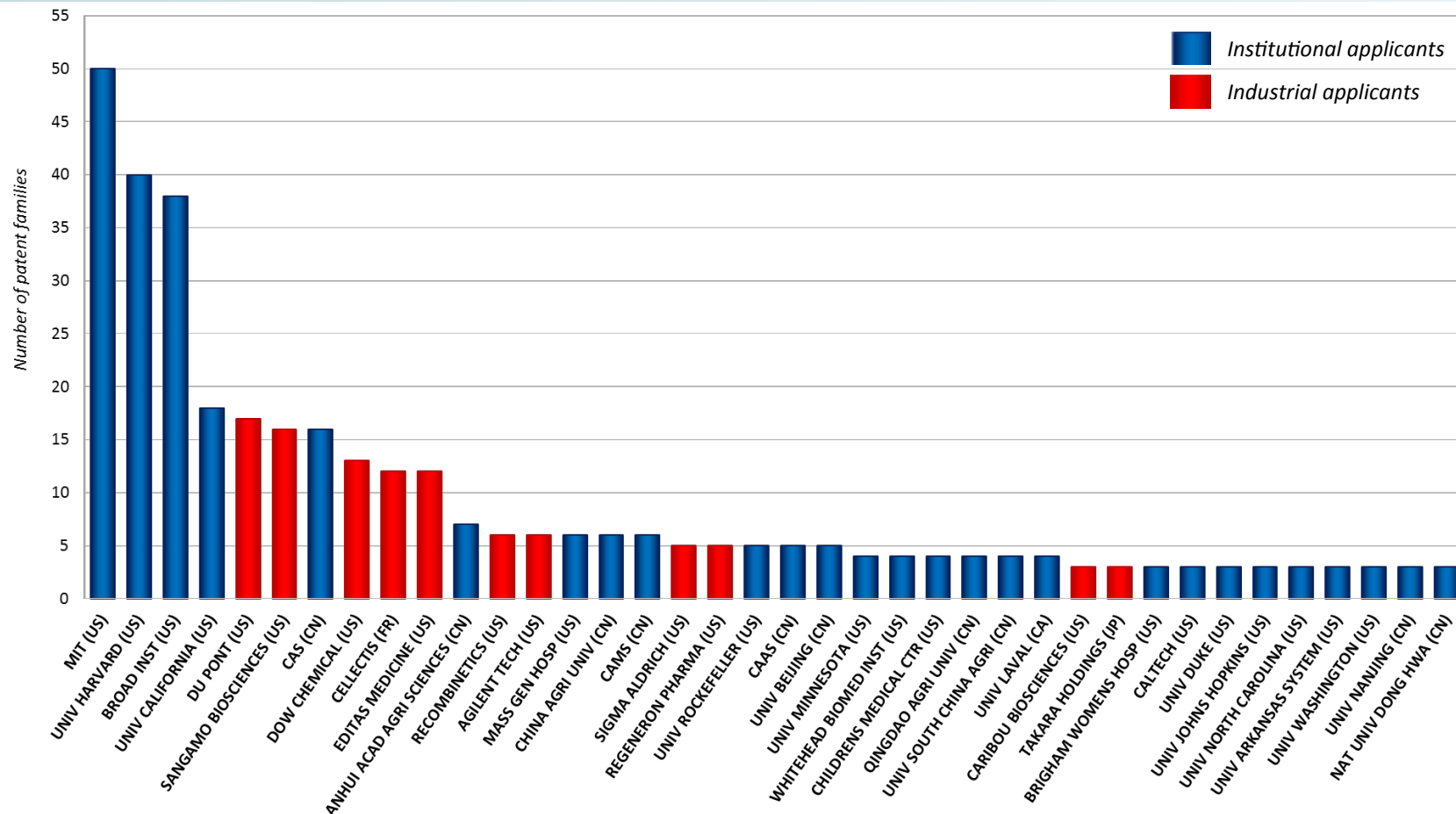
Temporal distribution of patent filings by type of applicants (2004-2015)



- 290 filings by institutional applicants (59.3%),
- 154 filings by industrial applicants (31.5%),
- 32 filings by individual inventors (6.5%),
- 13 co-filings between industrial applicants and institutional applicants (2.7%).
- The years 2014 and 2015 are not complete due to the delay of publication of 18 months.



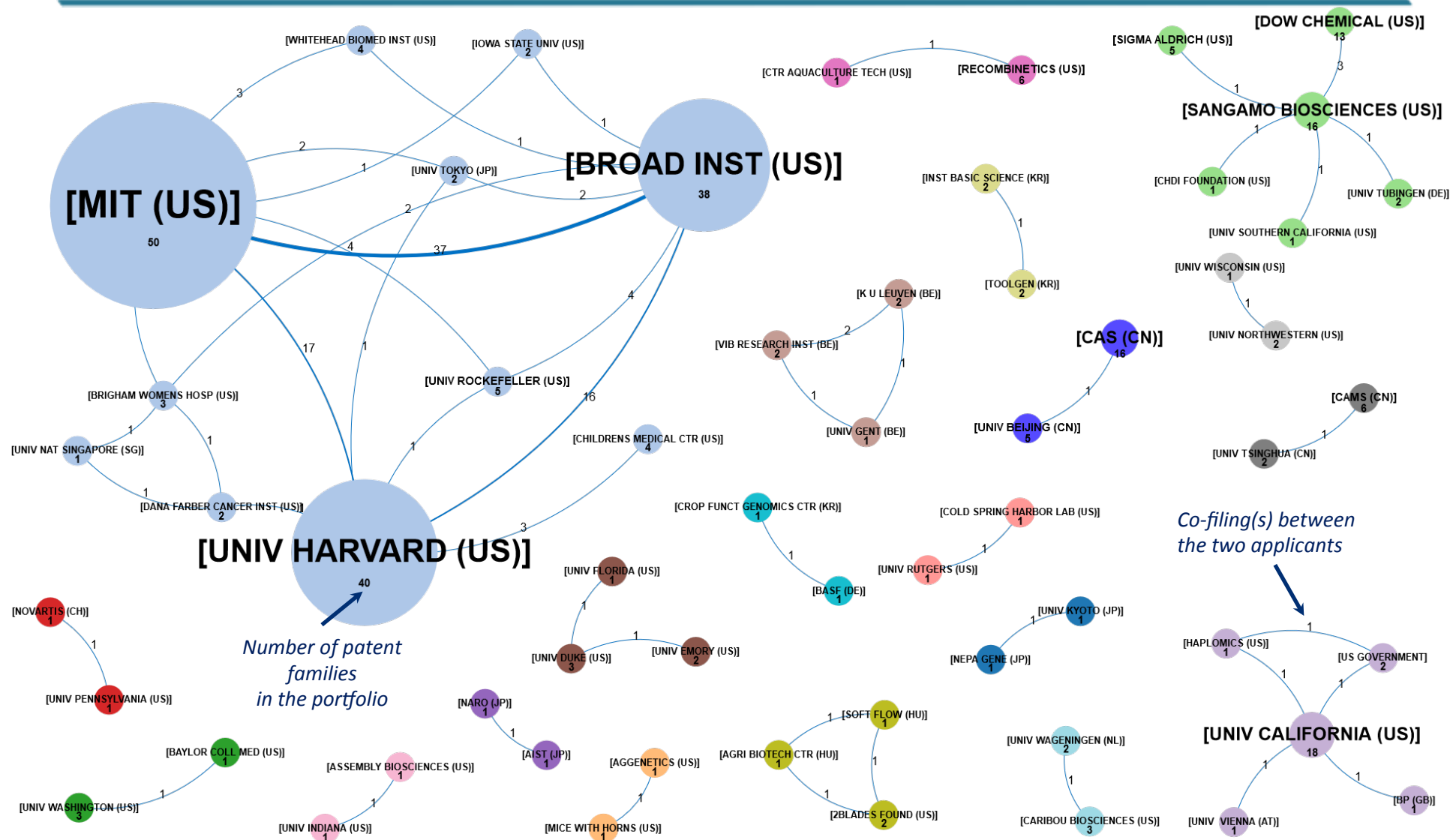
Main patent applicants/assignees (≥ 3 patent families)



- Affiliates & subsidiaries have been gathered under their parent company (Danisco with DuPont...). Co-filings are counted for each co-owner: a patent application co-filed between the MIT, the Harvard University and the Broad Institute is counted once for each co-applicant.
- Within the 38 main applicants, 27 are institutional applicants and 11 are industrial applicants.
- The patent portfolio of DuPont comprises historical patent families on CRISPR sequences dealing with the typing of bacterial strains, cultures with improved phage resistance and applications for preparing food.



Co-filings between applicants/assignees



- The co-filing map shows the co-filings between applicants, resulting either from either a joint R&D project or a later assignment agreement as registered in patent offices.



License announcements – SAMPLE PAGE (4)

Licensor	Scope	Licensee	Date
Toolgen	Worldwide license & sublicenses rights for research applications including the development and sale of reagents, cell lines, and animal models, as well as rights for high throughput screening, diagnostics, and bioproduction. ToolGen retains its rights in broad areas including high throughput screening, diagnostics, bioproduction, plant biotechnology and gene/cell therapy.	Thermo Fisher Scientific	2015/03
DuPont	The cross-license enables Caribou to develop and utilize CRISPR-Cas technology for product development in multiple fields including human and animal therapeutics, diagnostics, industrial biotechnology, research tools, and certain agriculture segments. The DuPont license to Caribou includes rights to the Cas9-mediated genome editing intellectual property owned by Vilnius University and exclusively licensed to DuPont.	Caribou Biosciences	2015/10
Caribou Biosciences	Multi-faceted agreement includes the cross-licensing of key intellectual property, a research collaboration, and financial investments by DuPont in Caribou, a developer of CRISPR-Cas technologies.	DuPont	2015/10
Crispr Therapeutics	\$105 million upfront—\$75 million in cash, \$30 million equity investment - future development, regulatory and sales milestones of up to \$420 million for each of up to six CRISPR-Cas9-based treatments for which Vertex has agreed to license exclusive development rights. Royalties on future sales.	Vertex	2015/10
ERS Genomics	Non-exclusively licensed patents related to CRISPR-Cas9 genome-editing technology to Regeneron Pharmaceuticals for use in drug discovery and development	Regeneron	2015/11



Breakdown of the CRISPR patent database

The 489 patent families have been systematically reviewed and classified by our genomics expert

'CLAIM COVERAGE' OF PATENT FAMILIES

Applications

- Genome editing with EN
- Modulation of gene expression
- Other application
- Therapeutic application
- Bioproduction
- Drug screening
- Genetically modified cell
- Transgenic animal
- Transgenic plant

Cell/Organism

- Human cell/subjet
- Mammalian cell/organism
- Other animal cell/organism
- Plant cell/organism
- Fungi-algae-yeast
- Eukaryotic cell/organism
- Prokaryotic cell
- Other organism
- Undefined cell/organism

'Molecular tools'

- Nuclease
- ZF Nuclease-ZFD
- Meganuclease
- TALE Nuclease-TALE P
- NA-targeting RNA
- CRISPR-assoc. protein
- CRISPR-Cas system
- Other chimeric protein
- Vector
- CRISPR sequence

- A patent family can be classified in several categories (e.g. 'Genome Editing with EN' and 'Therapeutic application' and 'Human cell' and 'CRISPR-Cas system'...).



Breakdown of the CRISPR patent database

The 489 patent families have been systematically reviewed and classified by our genomics expert

COMPONENTS

- CRISPR-associated protein
- mutated Cas - nickase
- dCas
- Cas9
- mutated Cas9 - nickase
- dCas9
- Other Cas
- Other mutated Cas
- NA-targeting RNA
- gRNA
- crRNA
- tracrRNA
- psiRNA
- Nuclease
- Meganuclease
- Integrase
- Recombinase
- Repressor-Activator
- Acetyltransferase
- Deacetylase
- Methyltransferase
- Demethylase
- Kinase
- Other catalytic domain
- Undefined catalytic domain

CHIMERIC PROTEINS

Chimeric nucleases

- Undefined nuclease
- ZF Nuclease
- Meganuclease
- TALE Nuclease
- RNA-Guided Nuclease
- Other chimeric nuclease

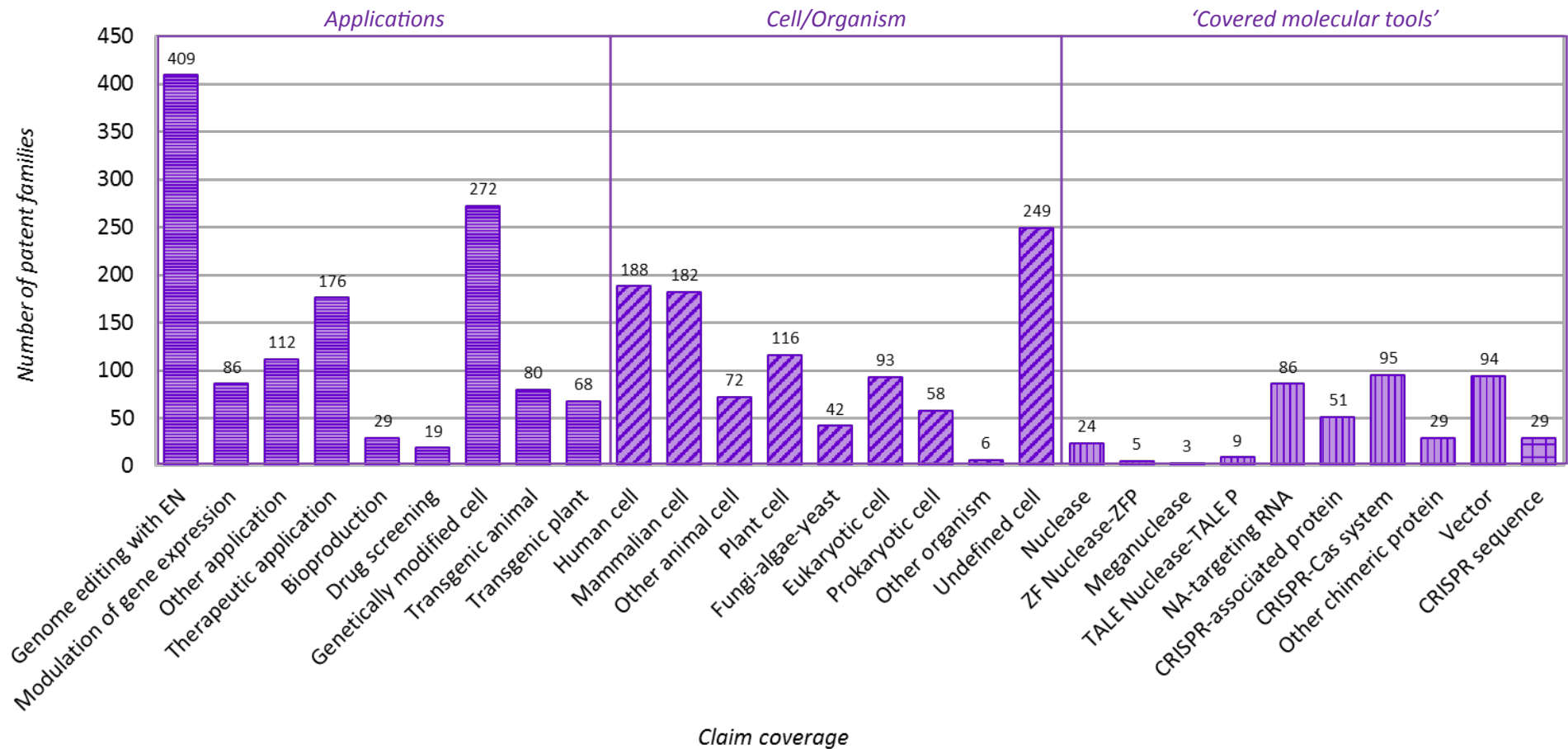
Other chimeric proteins

- A patent family can be classified in several categories (e.g. 'Genome Editing with EN' and 'Therapeutic application' and 'Human cell' and 'CRISPR-Cas system'...).



Breakdown by Claim coverage of patent families

Breakdown of the patent portfolio



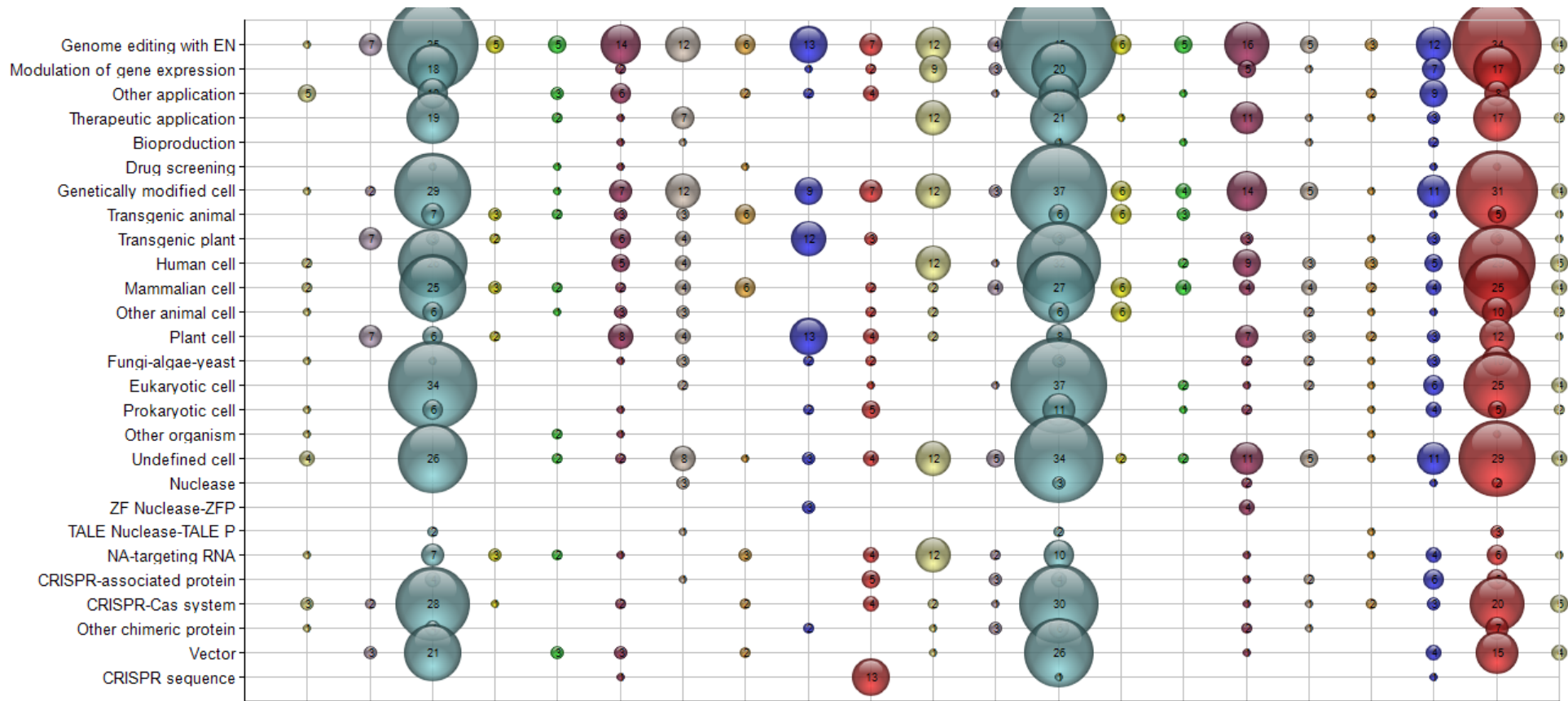
EN = Engineered Nucleases

NA-targeting RNA = Nucleic Acid-targeting RNA, guide RNA...



Breakdown by Claim coverage of patent families

Positioning of the main applicants/assignees (≥ 5 patent families)



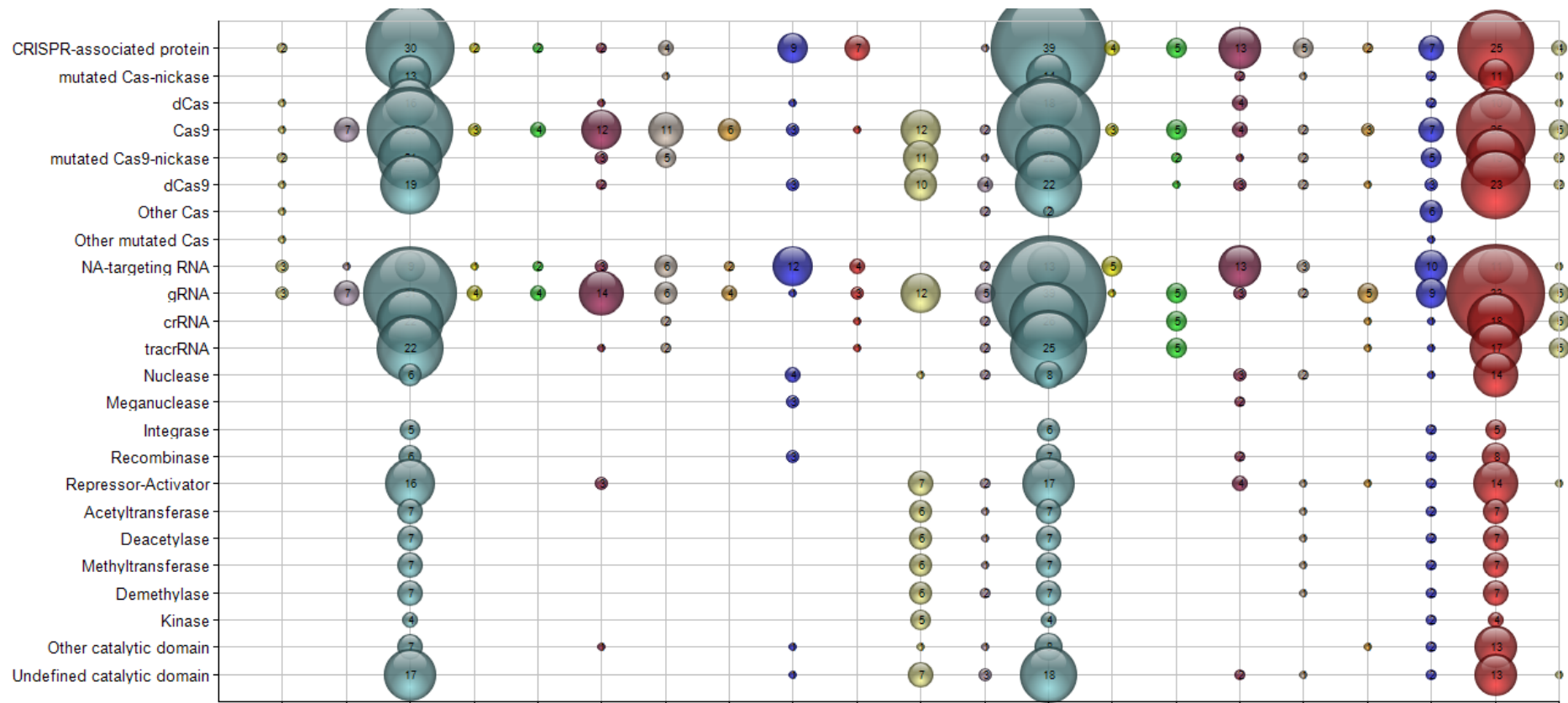
Distribution of applicants with at least 4 patent families in their patent portfolio

Order our full patent landscape to access the applicant names



Breakdown by Components

Positioning of the main applicants/assignees (≥ 4 patent families)



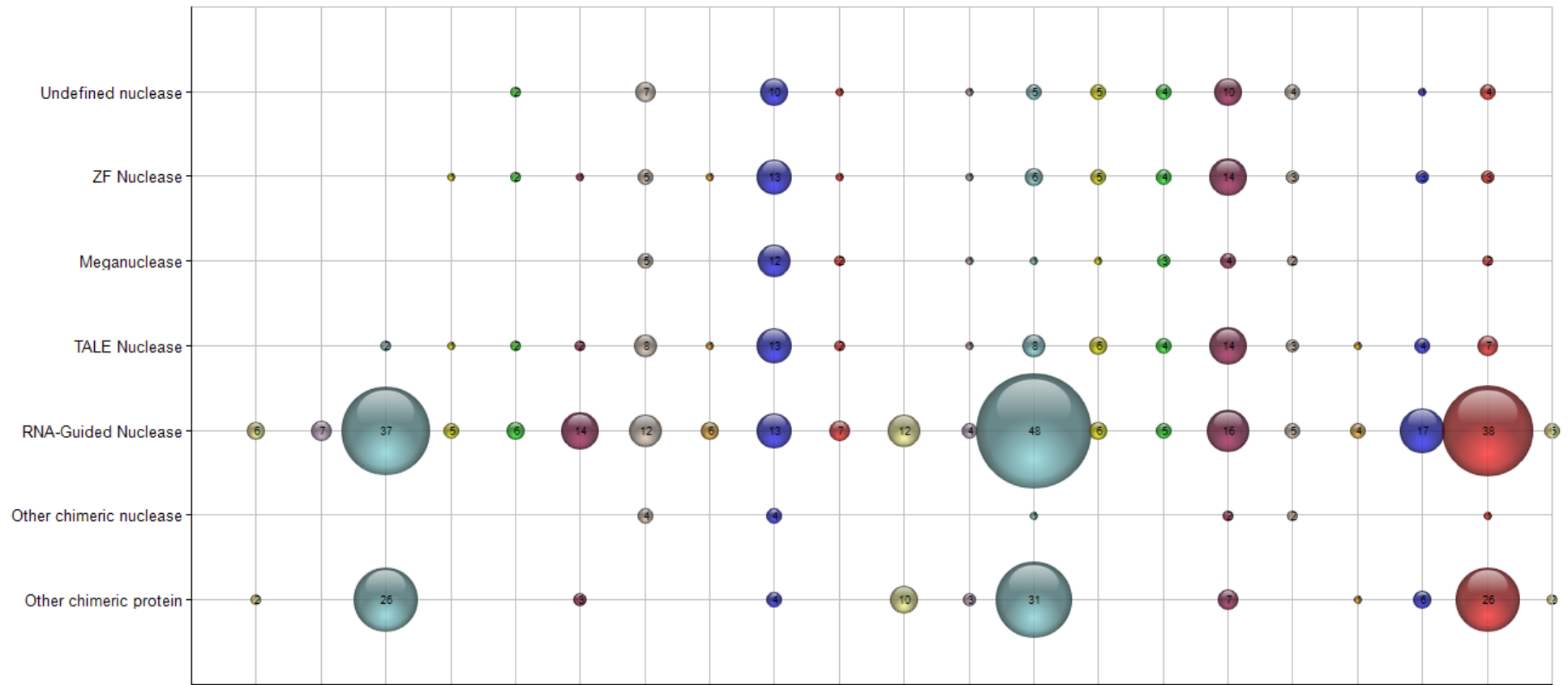
Distribution of applicants with at least 4 patent families in their patent portfolio

Order our full patent landscape to access the applicant names



Breakdown by Chimeric proteins

Positioning of the main applicants/assignees (≥ 4 patent families)



Distribution of applicants with at least 4 patent families in their patent portfolio
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Further analytics for your specific needs with the online database

- Zoom on patent portfolios of specific applicants
- Zoom on patents filed in a country/region (US, EP, CN...), within a time period
- Zoom on patents covering an application, a dedicated technology, a specification or a functional subset
- Link to online patent office registers to review latest legal status

The figure illustrates a patent analysis workflow for 'Microgels and microtissues for use in tissue engineering'. The workflow is represented by a green plant-like structure with arrows pointing to various data visualizations and patent documents. The plant has labels for 'Search', 'Geography', 'Originating countries', 'Protected countries', 'Extended countries', 'Dates', 'Organizations', 'Authors', 'Custom Fields', 'Patents', 'IPC', and 'ECLA'.

The visualizations include:

- A world map showing the geographical distribution of patents, with a legend indicating the number of patents (1-5, 5-20, 20-50, 50-100, 100-200, >200).
- A bar chart showing the number of documents over time (1998-2012).
- A dot matrix showing the presence of various biological samples (e.g., Urine, Tear, Serum, Semen, Saliva, Plasma, Pilegum, Mucus, Lymph, Hair, Food, Excreta, spinal fluid, Blood, Urine sample) across different patent entries.
- A list of patent descriptions, including:
 - Containers or dishes for laboratory use, e.g. laboratory glassware
 - Measuring or testing processes involving enzymes or micro-organisms, involving nucleic acids
 - Apparatus for enzymology or microbiology, Measuring or testing with condition measuring or sensing means, e.g. colony counters
 - Investigating or analysing materials by specific methods not covered by groups, Biological material, e.g. blood, urine, Chemical analysis of biological material, e.g. blood, urine, Immunoassay
 - Investigating or analysing materials by specific methods not covered by groups, Biological material, e.g. blood, urine, Chemical analysis of biological material, e.g. blood, urine, Immunoassay, with an insoluble carrier for immobilising immunochemicals
 - Apparatus for enzymology or microbiology
 - Investigating or analysing materials by specific methods not covered by groups
 - Measuring or testing processes involving enzymes or micro-organisms
 - Details not covered by any other group of this subclass
 - Investigating or analysing materials by the use of optical means, i.e. using infra-red, visible, or ultra-violet light
 - Chemical, physical, or physico-chemical processes in general
 - Tissue, human, animal or plant cell, or virus culture apparatus
 - Investigating or analysing materials by specific methods not covered by groups, Biological material, e.g. blood, urine

The patent documents shown are:

- WO/2012/119120: MULTIPLEXED DIAGNOSTIC SYSTEMS (WO/2012/119120)
- WO/2012/155110: MICROGELS AND MICROTISSUES FOR USE IN TISSUE ENGINEERING (WO/2012/155110)
- WO/2012/155111: MICROGELS AND MICROTISSUES FOR USE IN TISSUE ENGINEERING (WO/2012/155111)

The workflow is numbered 1 through 4, indicating a sequence of steps from search to analysis.

Order

This is only a sample report with partial data. Our full offer includes:

- an **analysis of the patent landscape**, covering 489 patent families, worldwide
- a **synthesis of IP strategy findings**, to visualize key trends in terms of patent applicants, collaboration networks, competitor technology positioning, key inventors and R&D white spaces out of the landscape
- an **on-line access to the 489 patent families set**, so you can visualize, navigate, focus and extract the most relevant patent data according to your specific needs.



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Contact us today for an offer at

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