University-Industry Partnerships as a Cornerstone of Regional Innovation Ecosystems: An Analysis of RTP Universities

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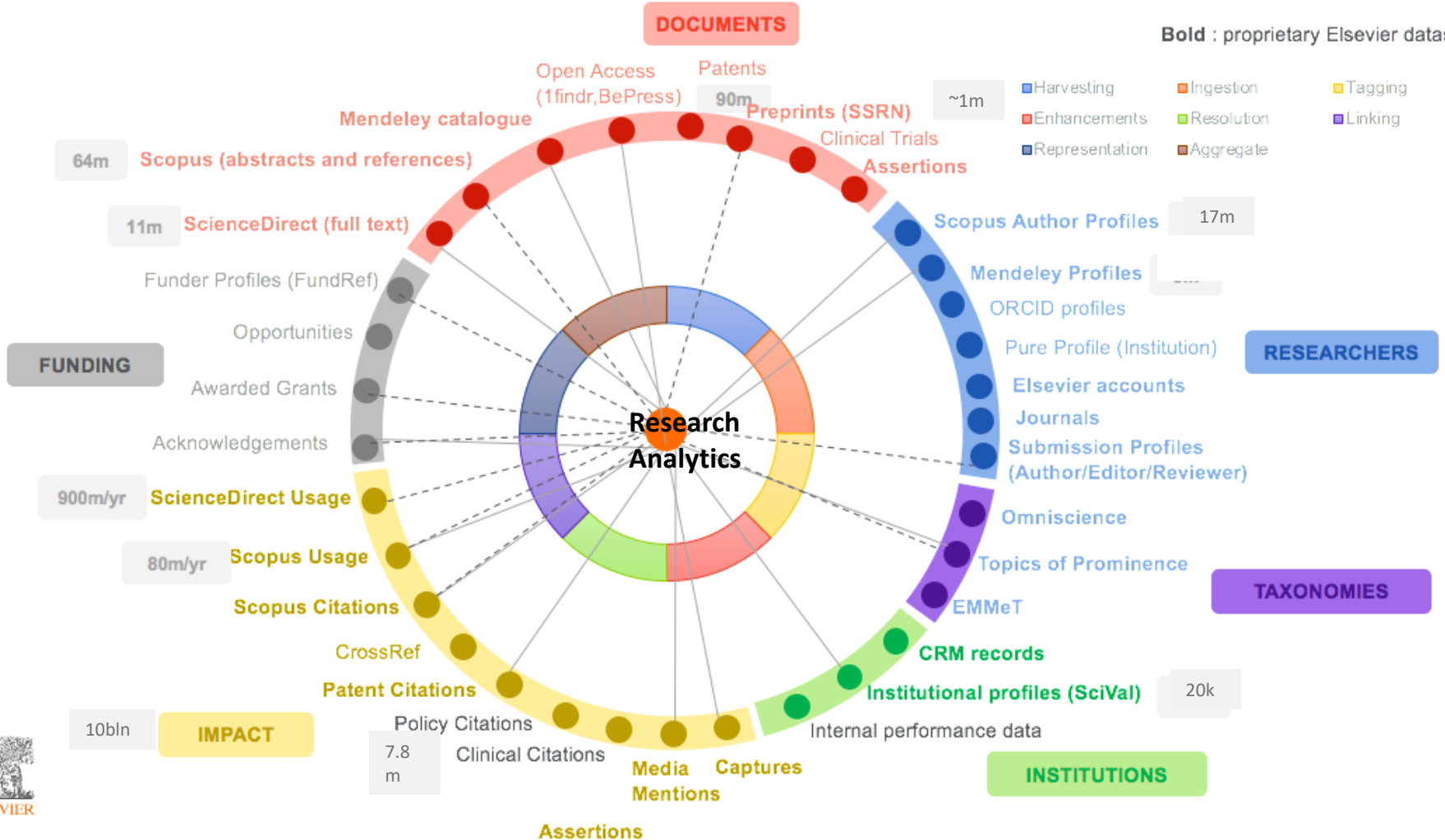
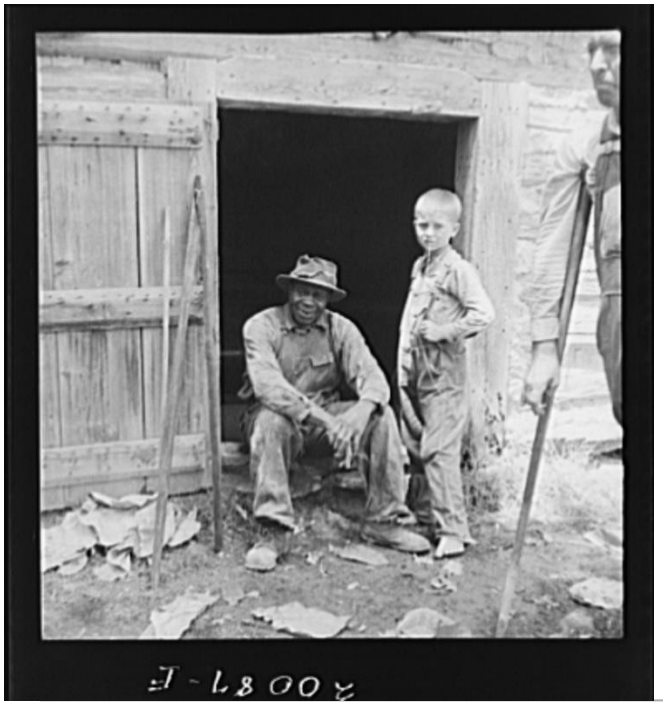
Elsevier Inc.

NC State University
27 October 2022

Elsevier: Linked data and analytics for professionals across industries



Triple Helix—Origins in Regional Development Strategies



In the 1950s, North Carolina was home to a deteriorating economic base rooted in tobacco, furniture manufacturing, small-scale farming and textiles, and had the second-lowest per capita income in the US. The state's economic future was highly uncertain.

Sources: Photo, Dorothea Lange, Library of Congress; text, www.rtp.org

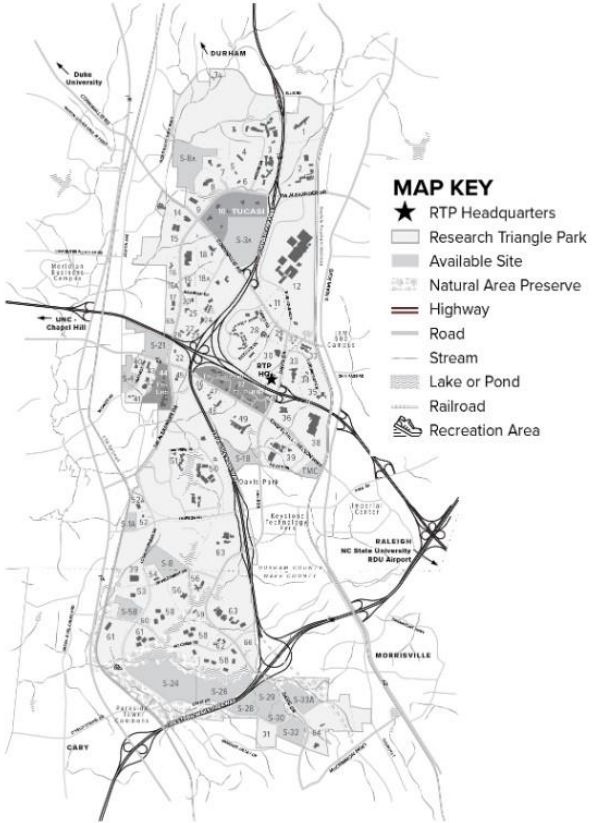
Research Triangle Park—The Mission

"The Research Triangle is the marriage of North Carolina's ideals for higher education and its hopes for material progress"

- High levels of integration between industry, university, and local/state govt.
- Multiple alliances
- Frequent conferences, events, sharing
- Accelerator and incubator space
- Work with voluntary organizations/NGO's
- 40% of 170 resident companies have fewer than 10 employees

Source: www.rtp.org

RTP Today



BioPharma Crescent

Key Performance Indicators, US vs. RTP Institutions , 2012-2021

Performance indicators

Outputs in Top Citation Percentiles

+ Add to Reporting

Publications in top 10% most cited worldwide

Show as field-weighted

RTP Triangle-Area Academic Research Institutions:
19.4%

> Analyze in more detail

Publications in Top Journal Percentiles

+ Add to Reporting

Publications in top 10% journals

by CiteScore Percentile

RTP Triangle-Area Academic Research Institutions:
44.9%

> Analyze in more detail

International Collaboration

+ Add to Reporting

Publications co-authored with Institutions in other countries/regions

RTP Triangle-Area Academic Research Institutions:
35.0%

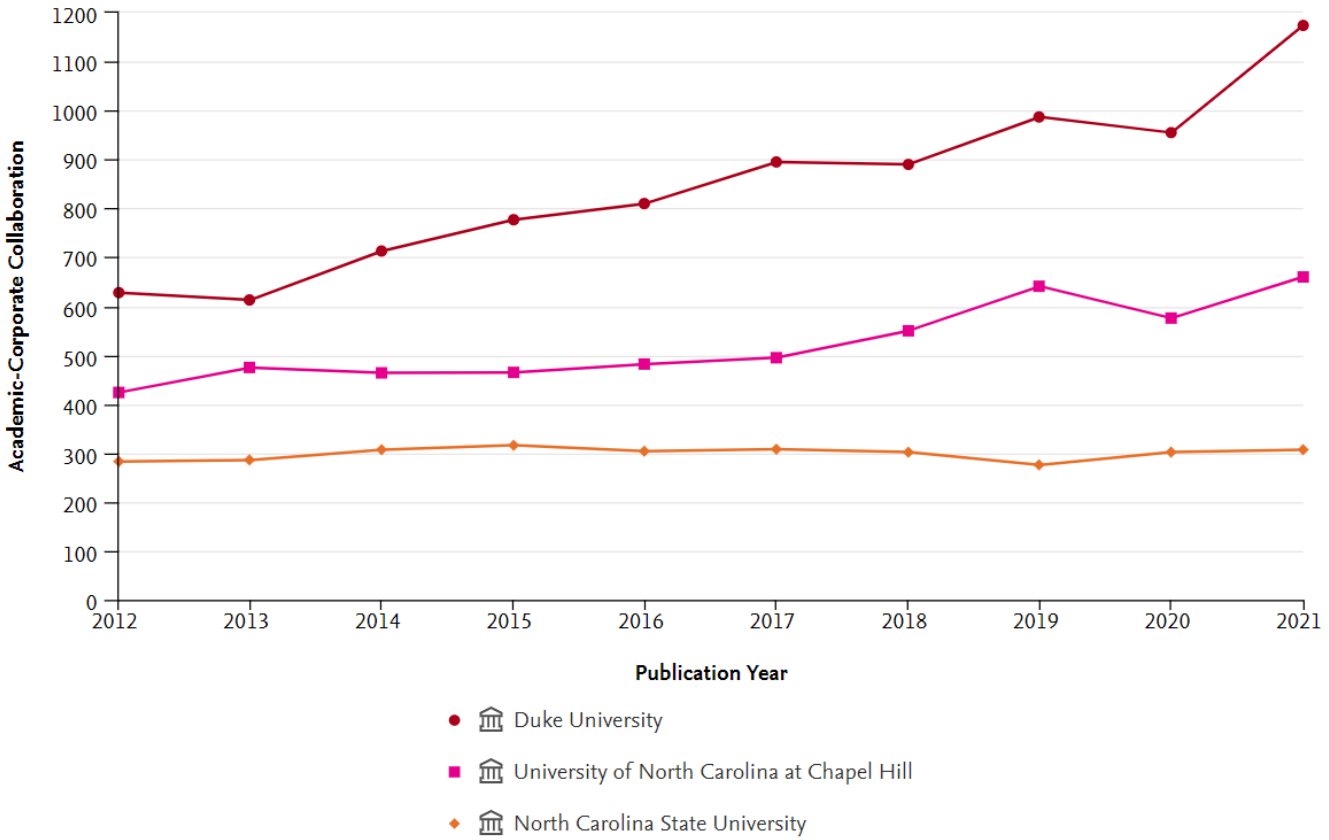
Academic-Corporate Collaboration

+ Add to Reporting

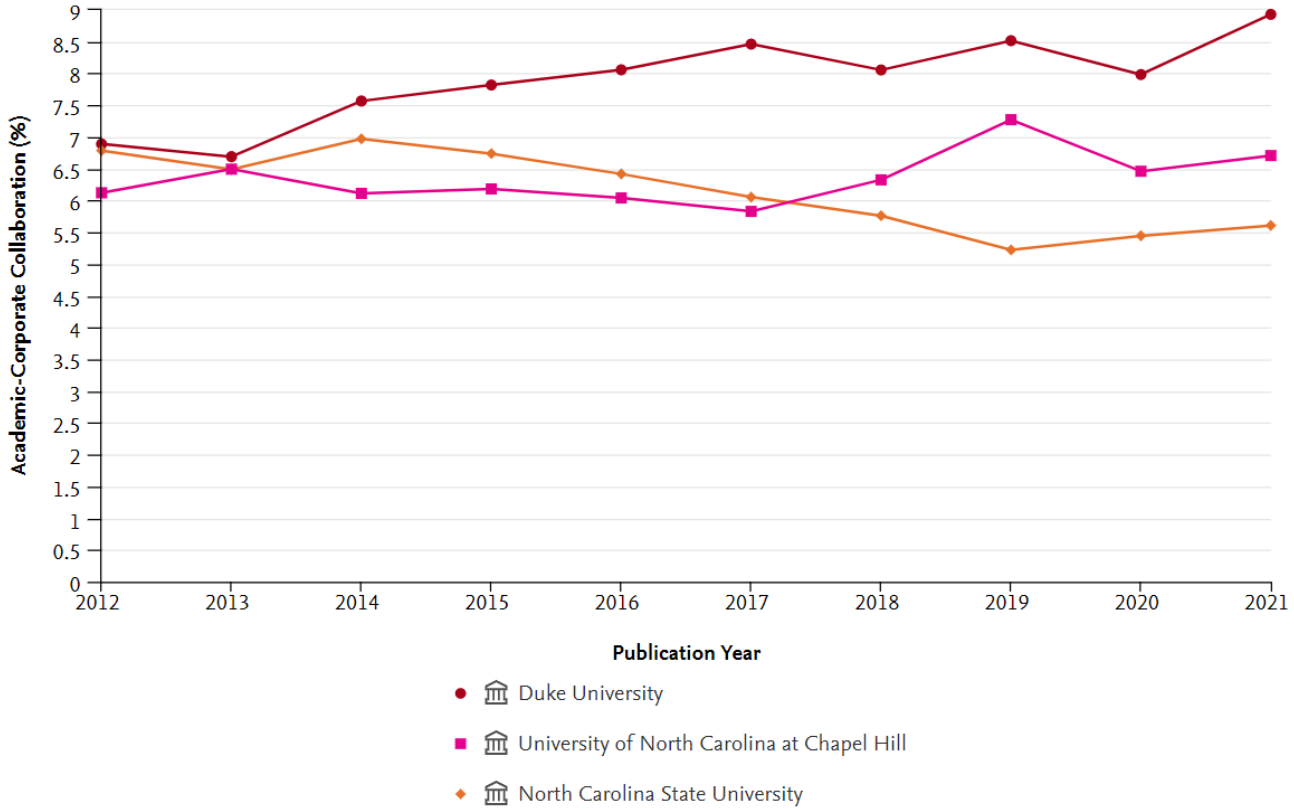
Publications with both academic and corporate affiliations

RTP Triangle-Area Academic Research Institutions:
6.9%

Academic-Corporate Collaboration (Output), 2012-2021



Academic-Corporate Collaboration (%), 2012-2021



Academic-Corporate Collaboration Rates, 2017-2021

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Metric		Scholarly Output	Field-Weighted Citation Impact
Academic-corporate collaboration	6.5%	2,922	4.68
No academic-corporate collaboration	93.5%	41,828	1.70

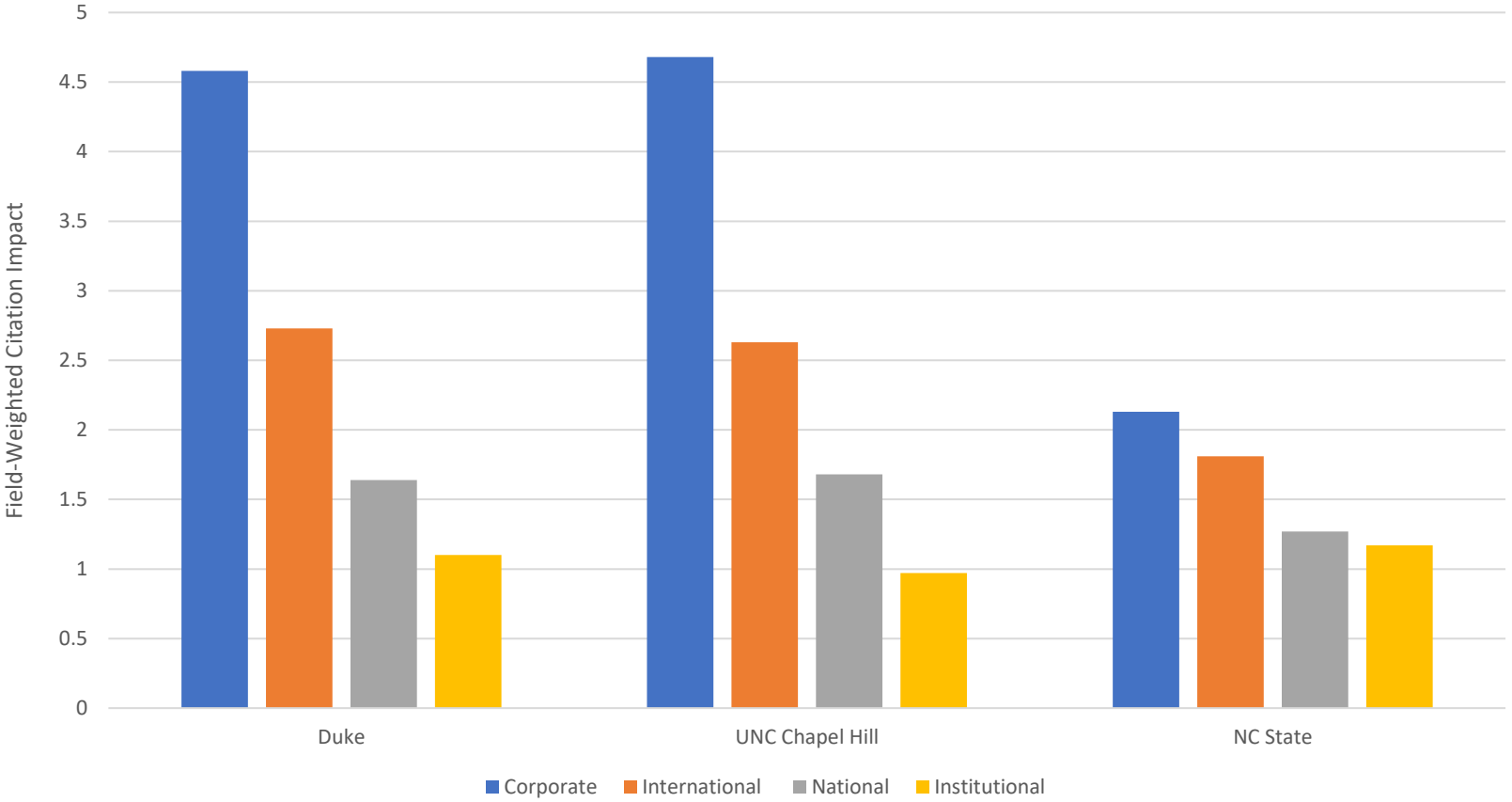
Duke UNIVERSITY

Metric		Scholarly Output	Field-Weighted Citation Impact
Academic-corporate collaboration	8.4%	4,901	4.58
No academic-corporate collaboration	91.6%	53,420	1.73

NC STATE UNIVERSITY

Metric		Scholarly Output	Field-Weighted Citation Impact
Academic-corporate collaboration	5.6%	1,495	2.13
No academic-corporate collaboration	94.4%	25,137	1.37

Citation Impact by Collaboration Type, 2017-2021



Duke University Top Corporate Collaborators, 2017-2021

Institution	Co-authored publications	Field-Weighted Citation Impact
MOH Holdings Pte Ltd.	691 ▲	2.54
AstraZeneca	165 ▲	5.72
Merck	153 ▲	3.65
Johnson & Johnson	151 ▲	4.01
GlaxoSmithKline	143 ▼	4.82
Novartis	131 ▲	8.65
Pfizer	127 ▲	6.86
Alphabet Inc.	126 ▲	3.18
Eli Lilly	115	7.13
Novo Nordisk Foundation	110 ▲	8.71

Duke-AstraZeneca Collaboration

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Duke University

246 ▲

co–authors with AstraZeneca

1.97

Field–Weighted Citation Impact

Co–authored

165 ▲

publications

5.72

Field–Weighted Citation Impact

AstraZeneca

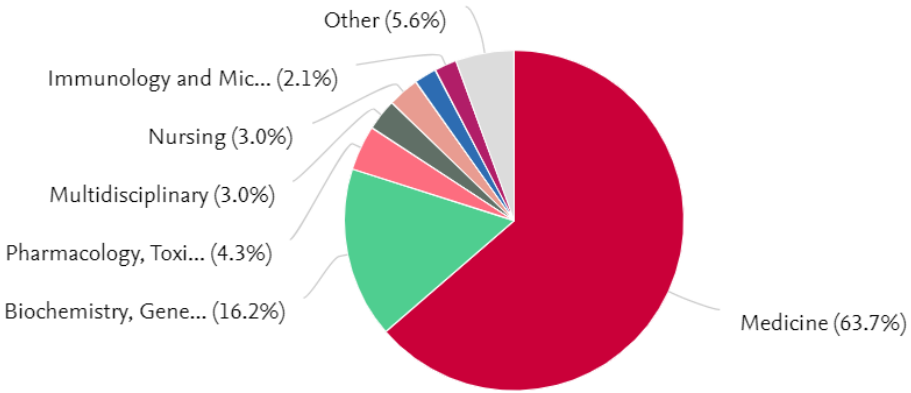
228 ▲

co–authors with Duke University

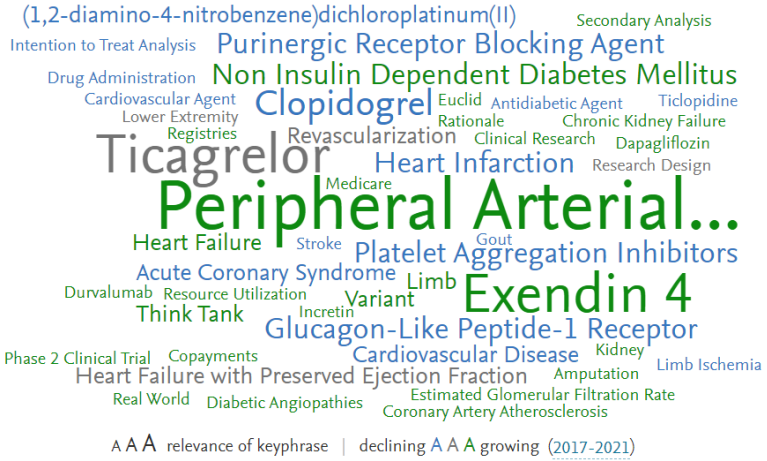
2.72

Field–Weighted Citation Impact

Subject Areas

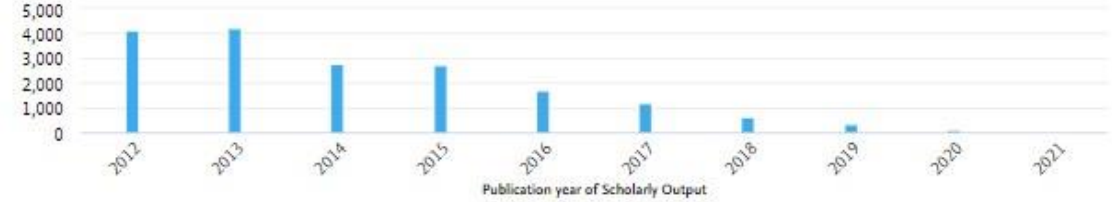


Keyphrase Analysis



Global Patenting Activity Citing Duke University Research

Citing-Patents Count

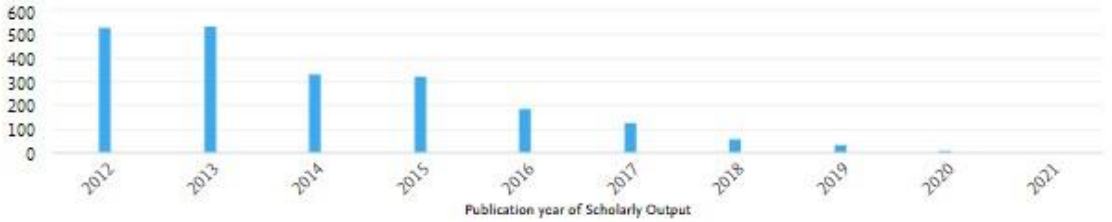


14,493

count of patents citing the Scholarly Output published at Duke University

View list of patents

Patent-Citations per Scholarly Output



193.8

average Patent-Citations received per 1,000 Scholarly Outputs published at Duke University

UNC Chapel Hill Top Corporate Collaborators, 2017-2021

Institution	Co-authored publications	Field-Weighted Citation Impact
Novo Nordisk Foundation	157 ▲	7.59
GlaxoSmithKline	153 ▲	3.79
Leidos Inc	112	5.63
Pfizer	112 ▲	6.27
Merck	103 ▼	3.57
AstraZeneca	100 ▲	6.06
Johnson & Johnson	100 ▲	7.48
Eli Lilly	79 ▲	4.85
Social & Scientific Systems Inc	76 ▼	1.53
Fimlab Laboratories	70 ▲	9.16

UNC Chapel Hill-Novo Nordisk Collaboration

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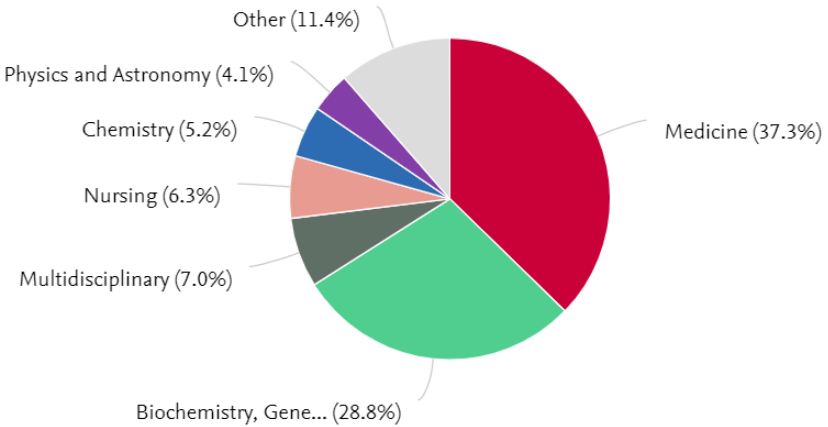
University of North Carolina at Chapel Hill	Co–authored	Novo Nordisk Foundation
139 ▲ co–authors with Novo Nordisk Foundation	157 ▲ publications	183 ▲ co–authors with the University of North Carolina at Chapel Hill
1.90 Field–Weighted Citation Impact	7.59 Field–Weighted Citation Impact	2.37 Field–Weighted Citation Impact

Subject Areas



Keyphrase Analysis

Novo Nordisk Top Research Topics 2012-2021

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Novo Nordisk Foundation ☆

Report from template

Denmark | More details on this Institution

2012 to 2021 | All subject areas | ASJC | Data sources

Topic	At this Institution: Scholarly Output	At this Institution: Publication Share	At this Institution: Field-Weighted Citation Impact	Worldwide: Prominence percentile
Dulaglutide; Lixisenatide; Antidiabetic Agent T.2086 | Analyze at Institution | Analyze further ...	304	11.29% ▲	5.24	98.401
Insulin Degludec; Basal Insulin Peglispro; Hypoglycemia T.19676	185	17.32% ▼	2.60	90.283
Intestine Flora; Ruminococcaceae; Microorganisms T.455	180	0.84% ▼	6.58	99.991
Genome; Systems Biology; Document Markup Languages T.1396	148	4.63% ▲	2.51	99.210
Escherichia Coli; Isobutanol; Mevalonic Acid T.10715	129	5.22% ▼	2.48	99.435
Insulin Glargine; Insulin Replacement Therapy; Non Insulin Dependent Diabetes Mellitus T.962	119	11.01% ▼	0.55	87.622
Hypoglycemia; Patient with Type 1 Diabetes; Insulin Dependent Diabetes Mellitus T.3810	109	9.49% ▲	1.34	91.657
Hemophilia A; Patient with Hemophilia; Recombinant Blood Clotting Factor 8 T.1417	102	4.20% ▲	0.95	97.272
Dipeptidyl Peptidase IV Inhibitor; Linagliptin; Cardiovascular Disease T.7451	93	2.97% ▲	12.20	98.931

NC State Top Corporate Collaborators, 2017-2021

Institution	Co-authored publications	Field-Weighted Citation Impact
IBM	54 ▼	2.13
ABB Group	50 ▲	1.63
Intel	37 ▲	1.77
Cotton Incorporated	33 ▲	1.99
Microsoft USA	33 ▼	2.04
SAS Institute, Inc.	33 ▲	1.00
Samsung	28 ▼	1.11
Alphabet Inc.	27 ▲	10.92
Bayer AG	26 ▲	1.74
Leidos Inc	26 ▼	10.30

NC State-IBM Collaboration

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North Carolina State University

68 co–authors with IBM

1.41 Field–Weighted Citation Impact

Co–authored

54 publications

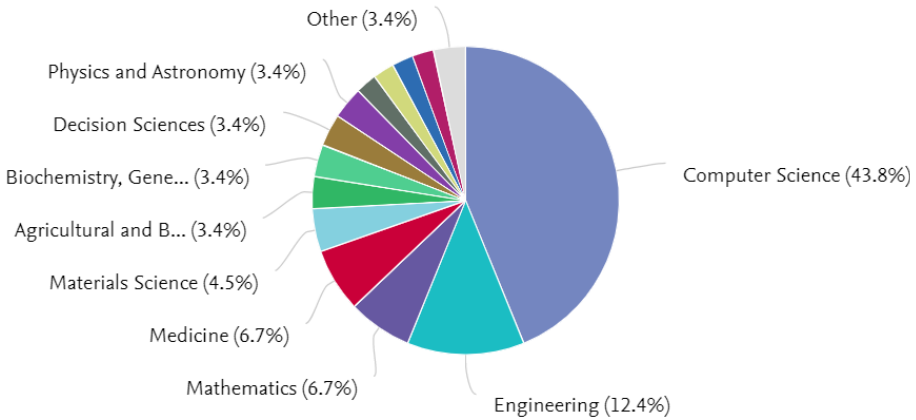
2.13 Field–Weighted Citation Impact

IBM

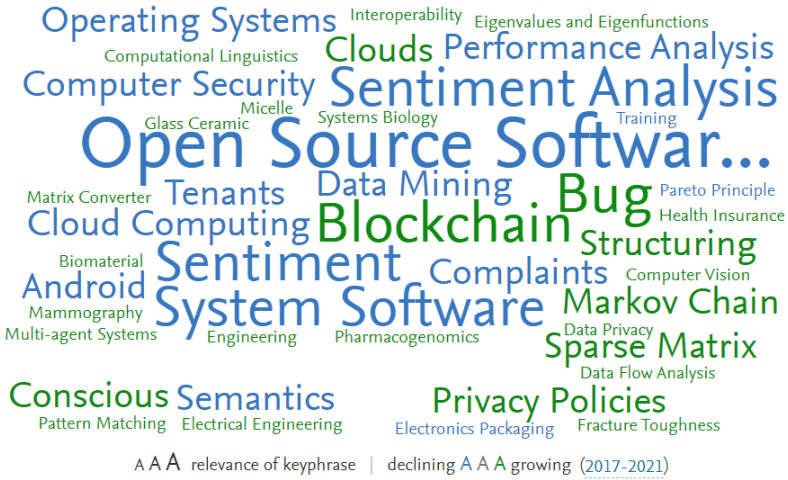
62 co–authors with North Carolina State University

1.88 Field–Weighted Citation Impact

Subject Areas



Keyphrase Analysis



North Carolina Central University Overview

Overall research performance

817 ▲

Scholarly Output

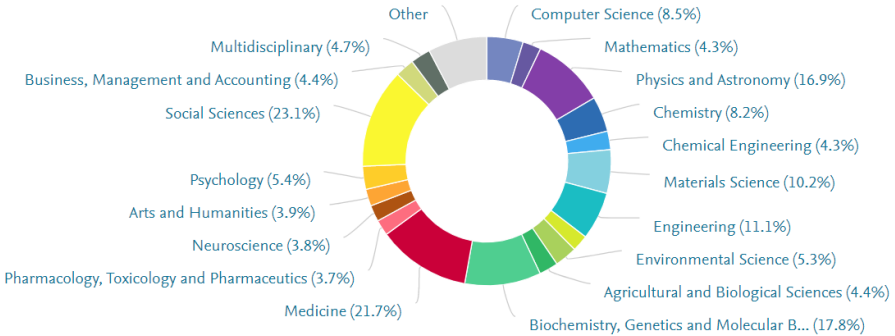
567 ▲

Authors

1.05

Field-Weighted Citation Impact

Publication share by Subject Area

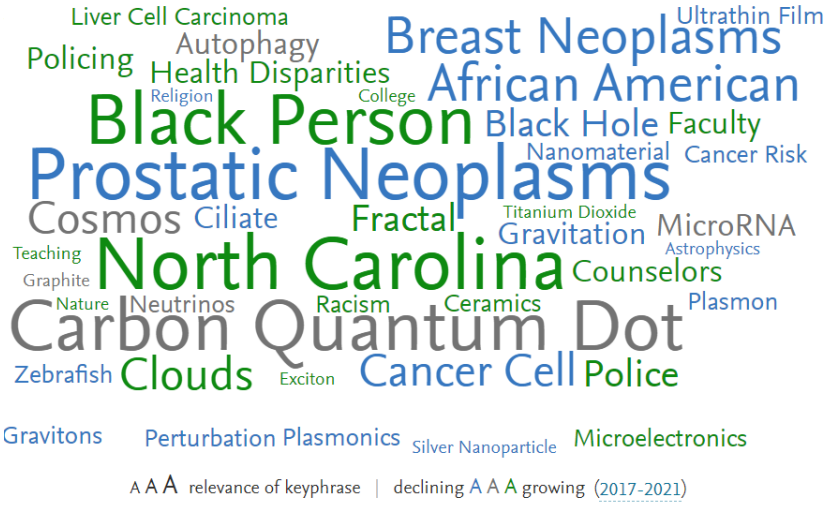


Academic-Corporate Collaboration

Scholarly Output at North Carolina Central University with both academic and corporate author affiliations

Metric		Scholarly Output
Academic-corporate collaboration	1.8%	15
No academic-corporate collaboration	98.2%	802

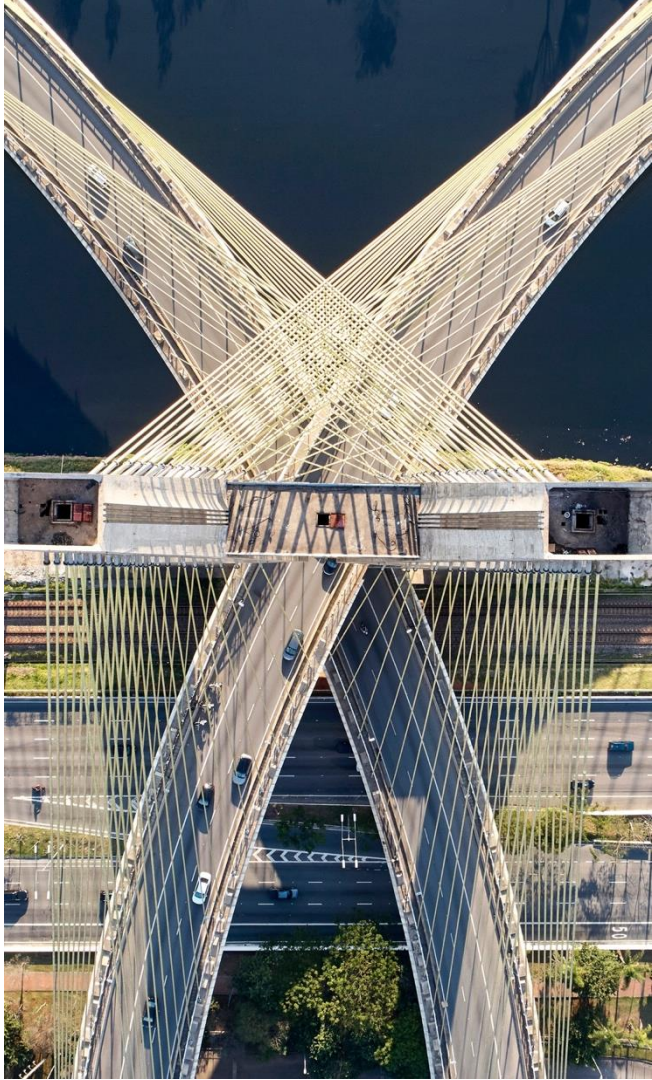
Keyphrase analysis



LexisNexis®

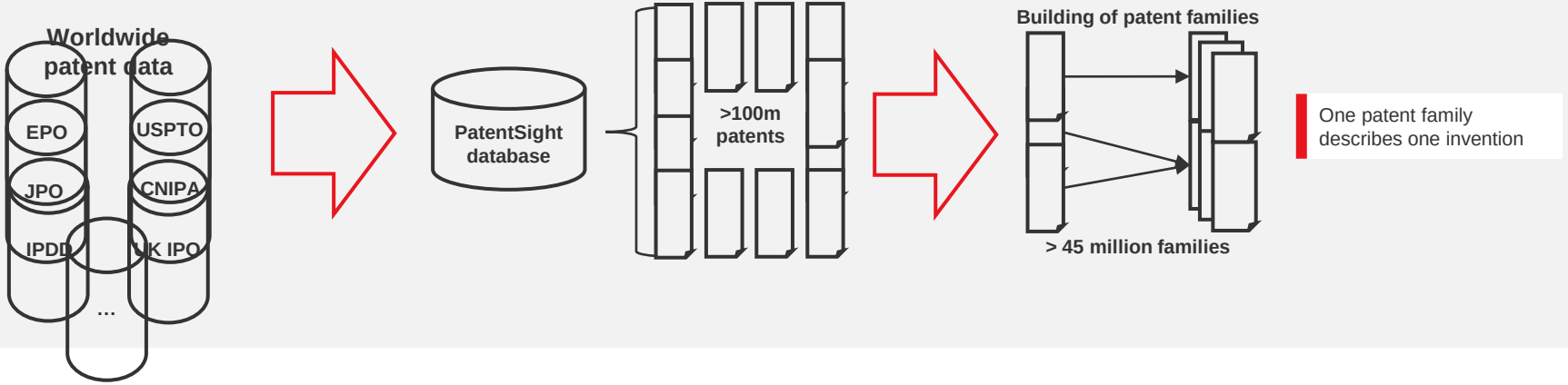
PatentSight®

North Carolina's Research Triangle Park: Innovation through a University Patent Perspective



We collect and clean data on more that 100 million patents…

Working process I

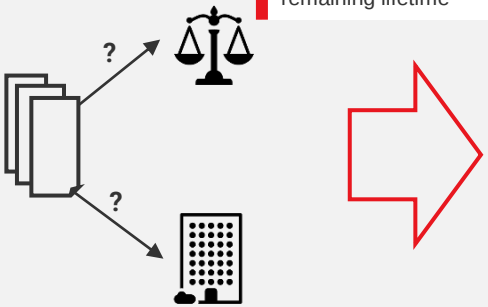


… and enhance patent data

Working process II

Check for legal status & ownership

Check for validity and remaining lifetime

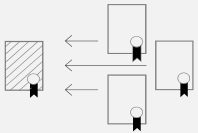


Ultimate owner concept:
See who has commercial power over the innovation!

Evaluation of patent families

by a unique algorithm based on two newly developed KPIs

Technology Relevance™



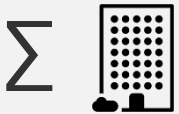
Market Coverage™

Objective, transparent and empirically validated!

Strength of a patent family

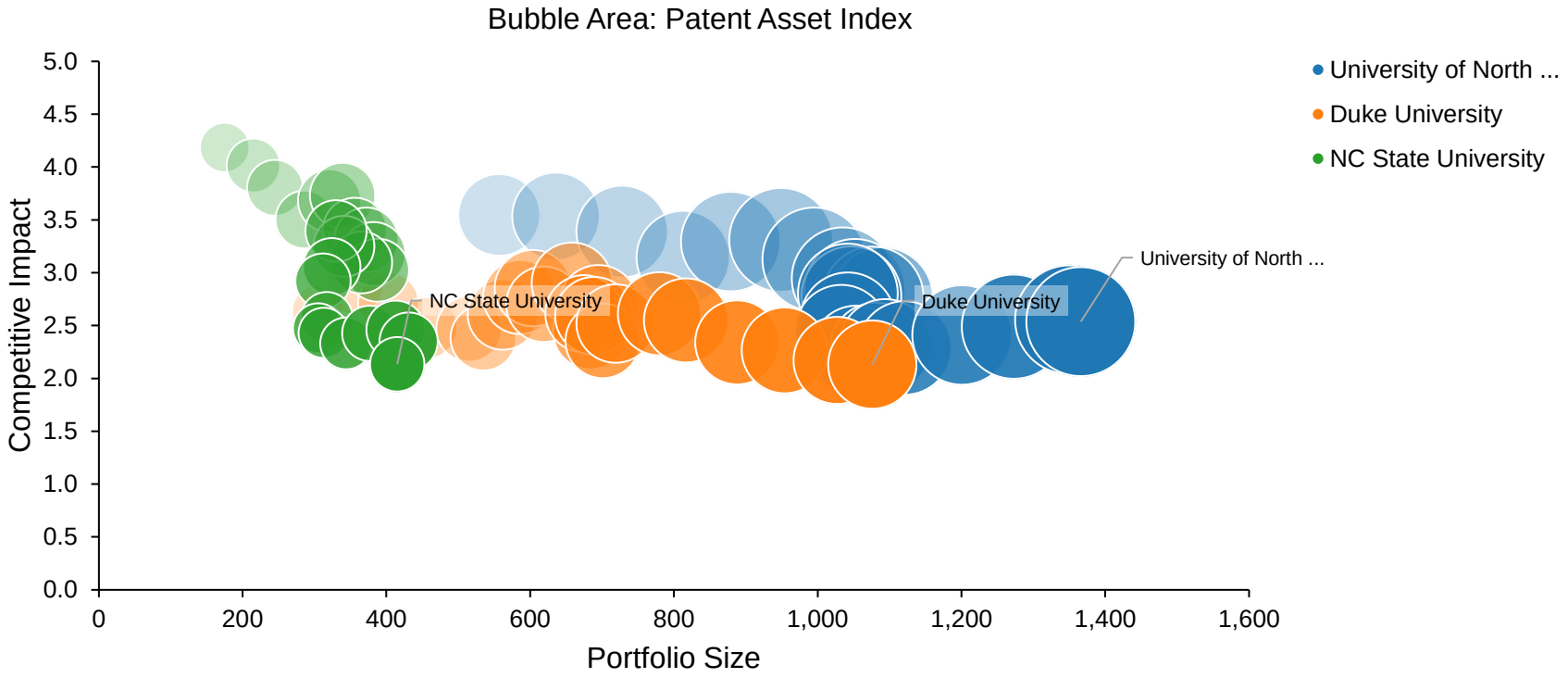
Competitive Impact™

Patent Asset Index™



Innovative strength of a company or portfolio (ability to achieve competitive advantage)!

Patent Portfolio Development of Research Triangle Universities over Time



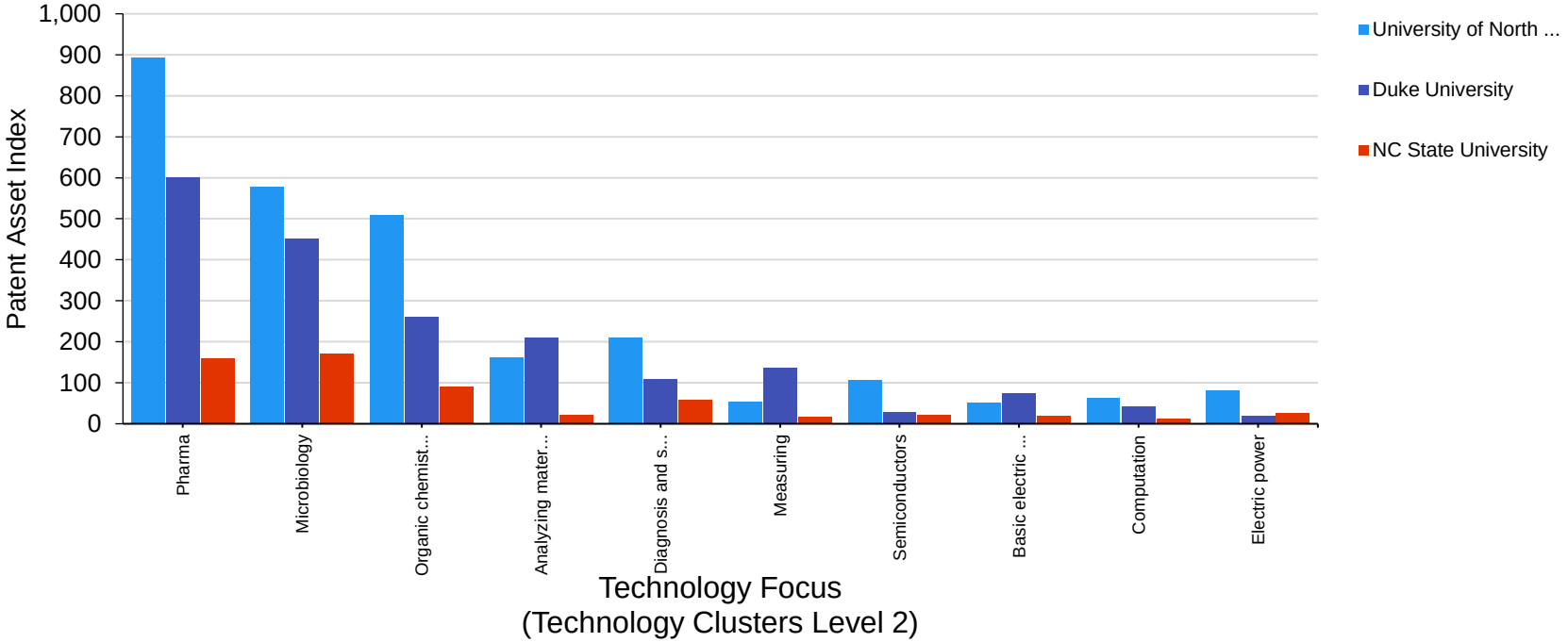
Top 15 Corporate Co-Owners of Duke University by Patent Asset Index™

	Owner	Co-Owner (Owner Excluded)	Patent Asset Index	Portfolio Size	Competitive Impact	Technology Relevance	Market Coverage
1	Duke University	Immunolight	144	18	8,0	4,3	1,7
2	Duke University	Illumina	143	12	11,9	9,6	1,3
3	Duke University	Precision BioSciences	89	1	89,5	38,0	2,4
4	Duke University	MacroGenics	18	3	6,0	2,2	2,5
5	Duke University	Ip2Ipo Innovations	12	1	11,8	8,9	1,3
6	Duke University	Endo International	11	1	10,6	4,6	2,3
7	Duke University	COLDQUANTA INC	11	2	5,3	2,0	2,7
8	Duke University	GlaxoSmithKline	7	3	2,4	1,8	1,5
9	Duke University	AQT SOLAR INC	7	3	2,3	2,3	1,0
10	Duke University	XILIS	6	3	2,0	0,9	2,2
11	Duke University	Tencent	6	3	1,9	3,4	0,6
12	Duke University	National Jewish Health	5	1	5,4	5,4	1,0
13	Duke University	Aeolus Pharmaceuticals	5	1	5,4	5,4	1,0
14	Duke University	Emory University	5	2	2,6	1,2	2,2
15	Duke University	GE	5	3	1,6	1,2	1,5

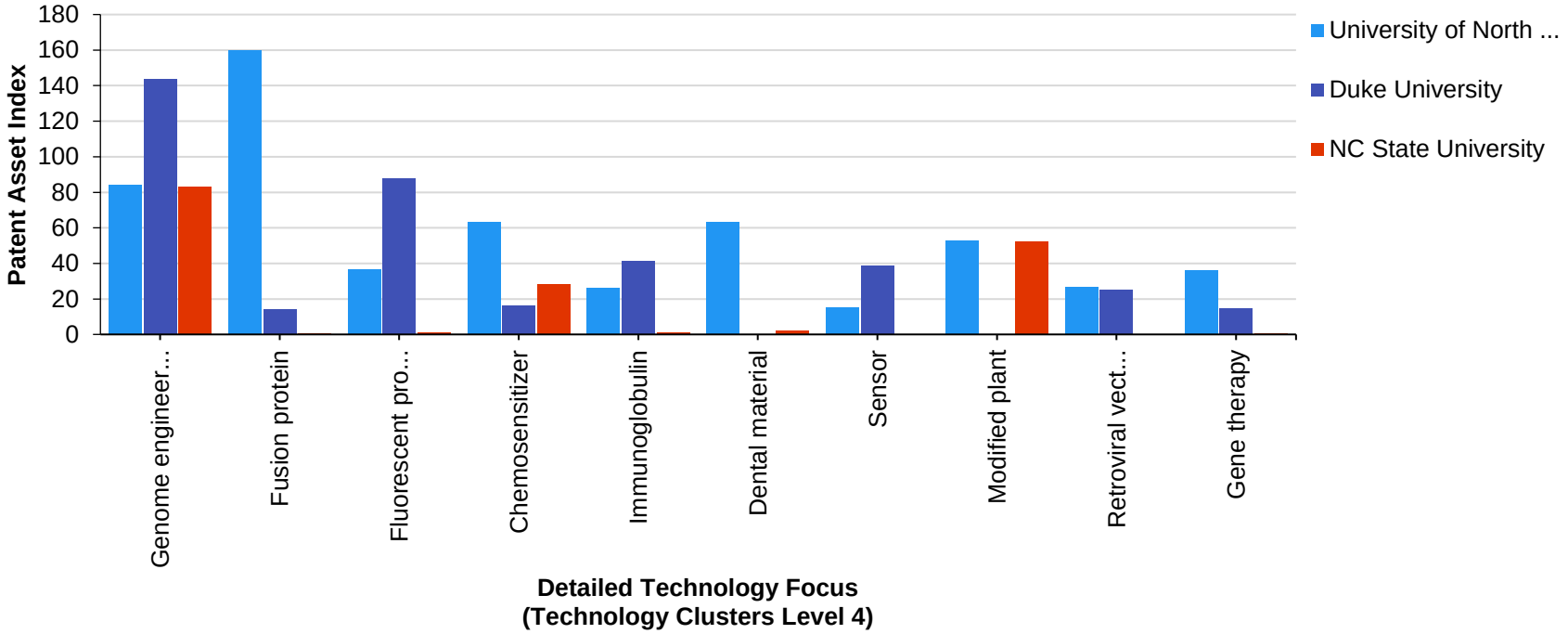
Top 15 Corporate Co-Owners of University of North Carolina by Patent Asset Index™

	Owner	Co-Owner (Owner Excluded)	Patent Asset Index	Portfolio Size	Competitive Impact	Technology Relevance	Market Coverage
1	University of North Carol...	Pfizer	27	1	27,1	9,9	2,8
2	University of North Carol...	Redbud Labs Inc	27	3	8,9	4,1	2,3
3	University of North Carol...	Honeywell	23	1	22,9	15,0	1,5
4	University of North Carol...	British American Tobacco	22	1	22,3	9,7	2,3
5	University of North Carol...	Entegrion, Inc	20	1	20,2	6,3	3,2
6	University of North Carol...	Eli Lilly	20	4	4,9	2,8	1,9
7	University of North Carol...	Genecentric Therapeutics Inc	17	6	2,9	1,3	2,1
8	University of North Carol...	ProMetic Life Sciences	17	4	4,3	1,8	2,4
9	University of North Carol...	Wolfspeed	15	2	7,7	3,7	1,3
10	University of North Carol...	BASF	15	4	3,8	1,3	2,8
11	University of North Carol...	Samsung	14	4	3,6	2,9	1,5
12	University of North Carol...	Androscience Corp	13	2	6,7	4,7	1,5
13	University of North Carol...	University of Rochester	13	2	6,7	4,7	1,5
14	University of North Carol...	Roche	12	3	3,9	3,0	1,4
15	University of North Carol...	TotalEnergies	10	6	1,7	1,3	1,4

Research Triangle Universities with Strong Technological Patenting Focus in Pharma, Microbiology, and Organic Chemistry



Specific Top Technological Focus by Each Research Triangle University



Glossary

Patent Asset Index™
The measure of overall patent portfolio strength. Calculated as the sum of the Competitive Impact™ of all patents contained in the portfolio.

Competitive Impact™
The economic value of the patents as measured by its Technology Relevance™ and Market Coverage™. Competitive Impact™ is stated relative to the other patents in the same field (e.g. a value of three means that the patent is three times as important as the average patent in the field).

Technology Relevance™
The relevance of the patent for the technical development. It is measured by looking at worldwide prior art citations to the patent (similar to how Google rates web pages by the links they get from other web pages).

Market Coverage™
The existence of active patent rights on the invention in world markets. If a larger market size is protected, Market Coverage™ is higher and the patent thus has a higher Competitive Impact.

Patent Family Definition
PatentSight uses the simple family concept of the European Patent Office (EPO) according to the DOCDB simple family definition. A simple patent family is a collection of patent documents that are considered to cover a single invention. The technical content covered by the applications is considered to be identical. Members of a simple patent family will all have exactly the same priorities.

Q&A

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ELSEVIER

Thank you

Methodology

- The analysis is based on the patent families, using the simple patent family definition of the European Patent Office.
- We track protected (“active”) patent portfolios over time. For a certain date (“Reporting Date”), Portfolio Size is the total stock of patents granted and active as well as pending patent applications as of that date.
- The analysis (including all reporting dates and filing dates) is based on our current ownership data:
  - The corporate patent portfolios include the patents of the parent company and all patents of their majority-owned subsidiaries, joint ventures, historic company names, merged companies, and patent reassignments/purchases as of today.
  - Patents acquired through, e.g., M&A are considered as if they always belonged to the current owner. E.g., if a merger has been completed in 2013, the portfolio we show for 2010 already includes the acquired company.
  - The opposite also applies: patents divested through, e.g., a spin-off or sale are considered as if they had never belonged to the divesting company. Portfolio information based on corporate structures of the past can be provided upon special request.
- Reporting Date used: 20-October-2022
- Sources used: DOCDB, INPADOC, LexisNexis IPDD, Corporate Tree with BvD and own research
- Utility models are excluded, unless stated otherwise.