RFID Innovation Frontline™

1Q. 2009

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Table of Contents

©2009 TechIPm, LLC All Rights Reserved

Table of Contents -2

©2009 TechIPm, LLC All Rights Reserved

List of Figures

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List of Figures -2

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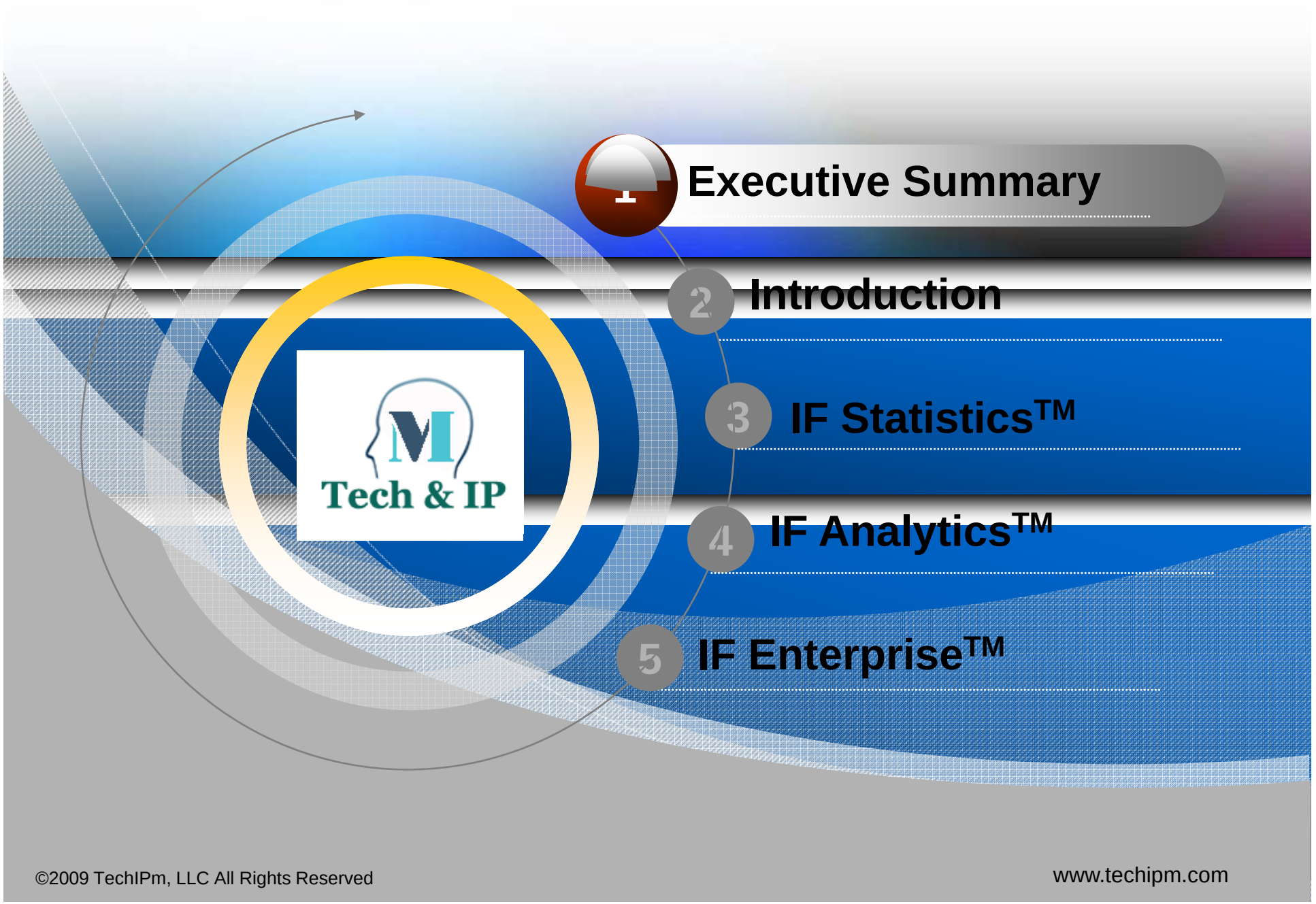

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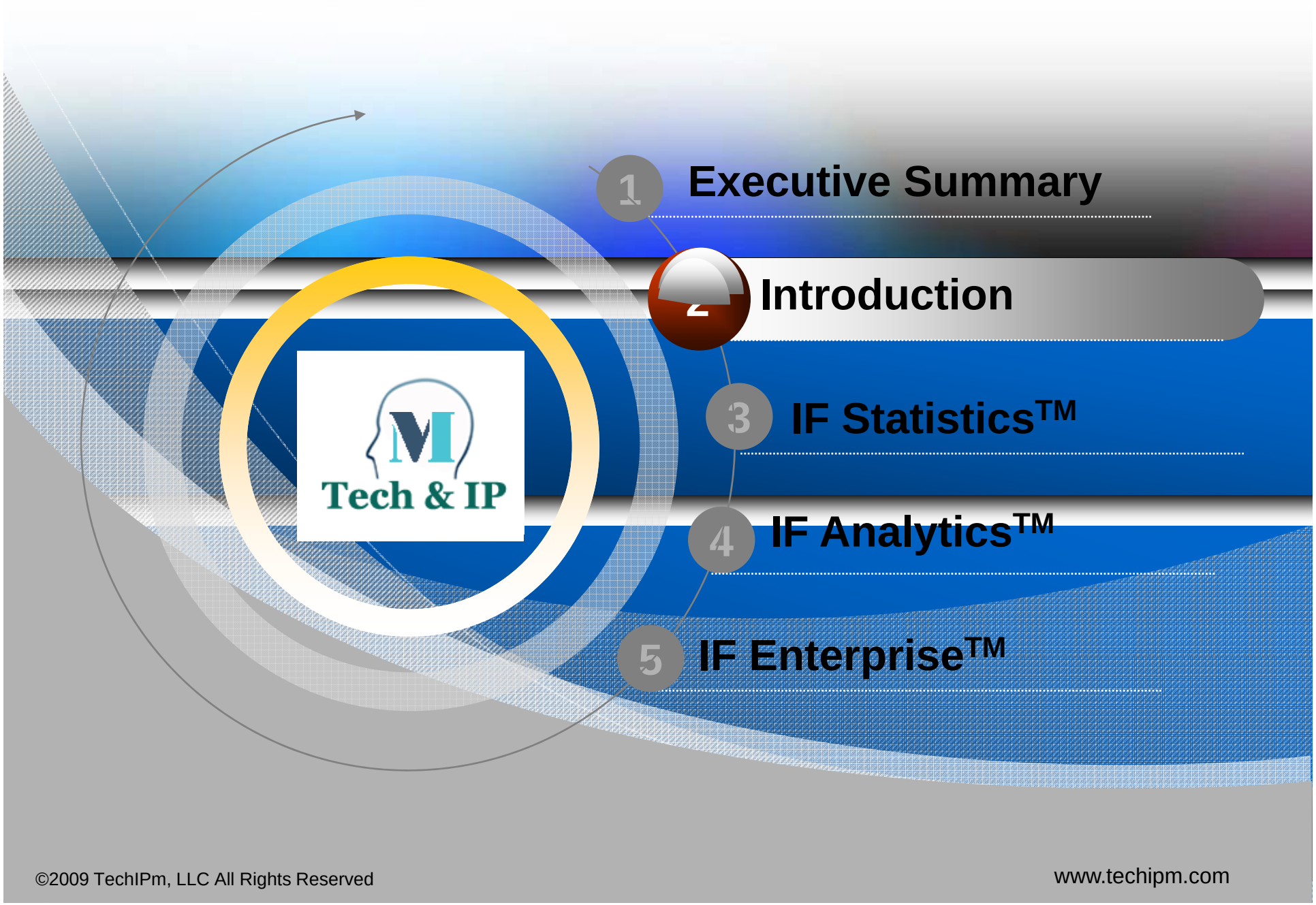

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2.1 What is RFID Innovation Frontline™?

RFID Innovation Frontline™ is a research report on the technology innovations landscape for Radio Frequency Identification (RFID).

RFID Innovation Frontline™ utilizes patent information to assess the state of the art for technology innovations in RFID.

RFID Innovation Frontline™ analyzes the utility patents issued in the United States (US) before January 1, 2009. Since the patent information are changed over time, this report only reflects the technology innovations landscape up to the time the analysis is conducted.

RFID Innovation Frontline™ is based on the statistical and analytical methods for mining patent information.

Research for RFID Innovation Frontline™ is done by an expert both in intellectual property (IP) and technology subject matter.

RFID Innovation Frontline™ can be used by customers for:

- Trend analysis for RFID technology/product/market forecasting
- Planning RFID technology/business strategy
- Competitive Intelligence for RFID industry
- IP strategy for RFID R&D
- Opportunity analysis for RFID technology licensing

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2.2 What's in RFID Innovation Frontline™?

Tech & IP

1. IF Statistics™

IF Statistics™ shows technology innovations landscape from the statistical analysis of bibliographical patent information such as the application/published/issued year, assignees, inventors, and patent classification codes etc.:

•Number of issued patents/published applications by application and issued year

•Ranking information by assignee (or inventor), nationality, UPC (or IPC), patent families, and citations

2. IF Analytics™

IF Analytics™ shows the technology innovations landscape from the in-depth quantitative and qualitative analysis of patent information by customized technology classifications:

•Number of patents by customized technology classifications

•Top assignees' patent portfolios by customized technology classifications

•Innovation indexes such as cites per patent (CPP), patent impact index (PII), and patent family size (PFS)

•Technology development snapshot for a focused field of technology

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2.2 What's in RFID Innovation Frontline™? -2

3. IF Enterprise™

IF Enterprise™ shows the technology innovations landscape for specific companies. In addition to all the contents in the IF Statistics™ and IF Analytics™ , IF Enterprise™ can include analysis for a specially requested research by customers:

•Duo diligence

•Strategy for the patent portfolio development

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2.3 Mining Process for RFID Innovation Frontline™

Step 1. Getting Patent Data:

•Patent Data Base Used in the Research: USPTO PAIR, WIPSGlobal, and Delphion

•Searching Method: keyword search for RFID and its variations such as IC tag, RF card, and RF label etc.

•Field of Search: front page (title, abstract, references etc.) and the first independent claim of a patent issued before January, 1, 2009

Step 2. Cleaning: review the keyword searched patent data for excluding design patents and patents whose subject field is not directly related with RFID (e.g. CallerID)

The number of patents reduces to 2559 from 3703 initially keyword searched patents in this step.

Step 3. Statistical analysis: analyze the bibliographical information

Step 4. Customized technology classifications: classification by RFID expert

Step 5. Analytical analysis: quantitative and qualitative analysis for patent data categorized by the customized classifications

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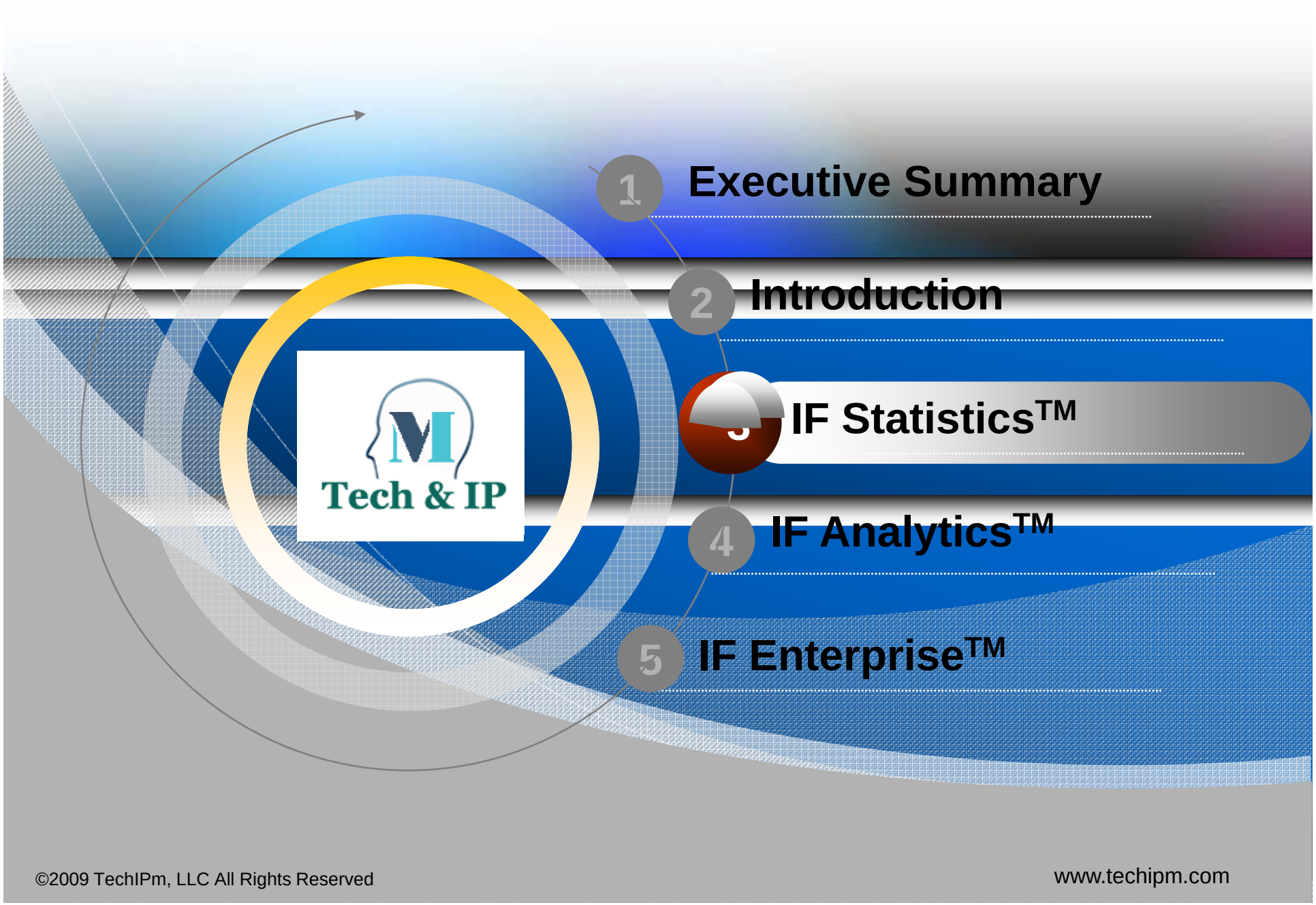

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Table 3.1 Data for fig. 3.1

Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Number of Patents by Issued Year	0	0	0	0	0	0	0	2	1	1	7	9	20
Number of Patents by Application Year	1	0	0	0	0	2	1	0	8	9	20	33	31
Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of Patents by Issued Year	26	27	35	47	90	122	116	116	168	191	404	546	630
Number of Patents by Application Year	36	68	102	159	155	186	254	282	498	478	194	37	5

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Fig. 3.2 Top 10 assignees for the RFID technology innovations

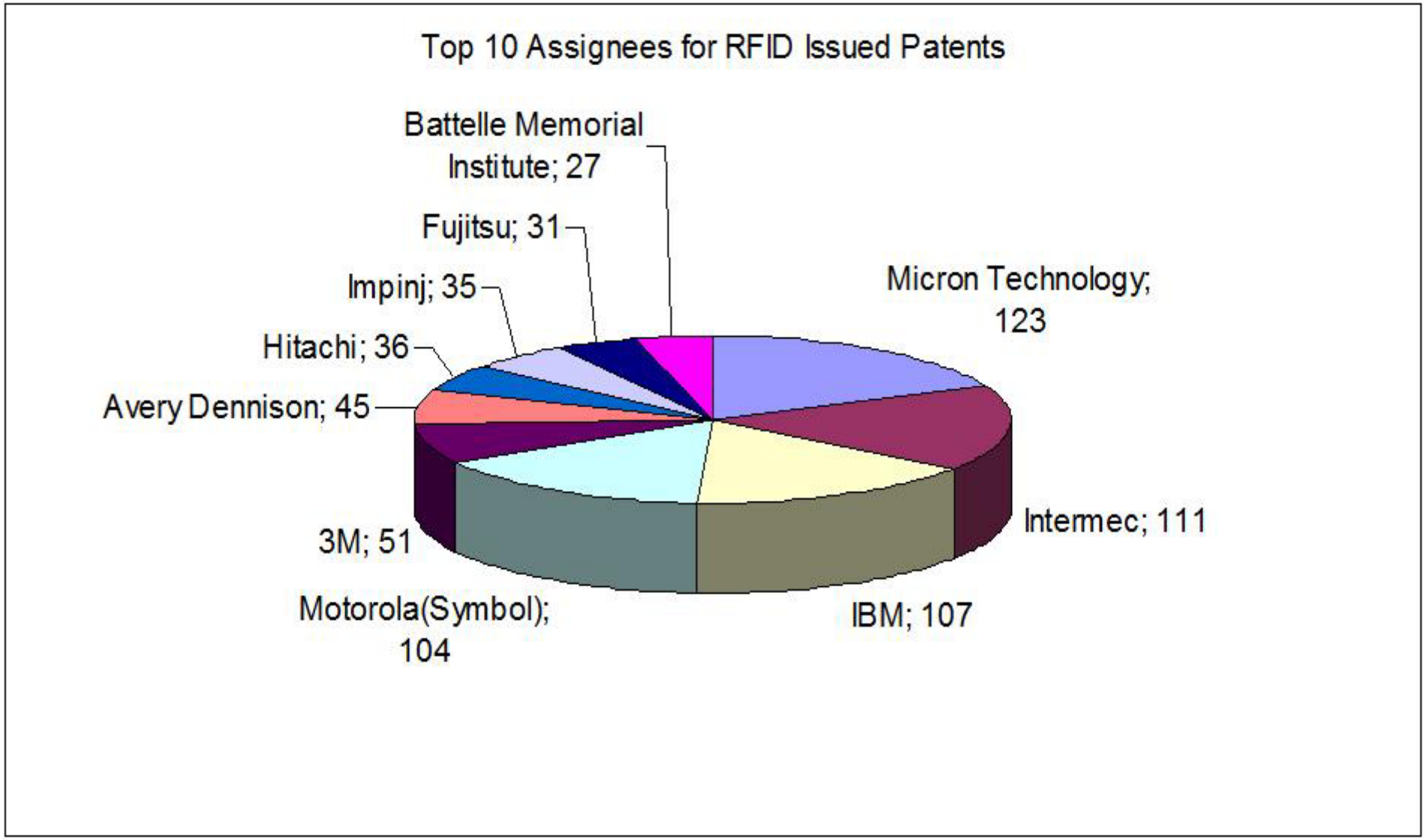

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Table 3.7 Data for fig. 3.7

Patent Number	Number of Citations
US5528222	308
US5629981	297
US5963134	206
US6100804	176
US5682143	157
US5317309	146
US5497140	142
US6025780	140
US5936527	140
US6107920	132

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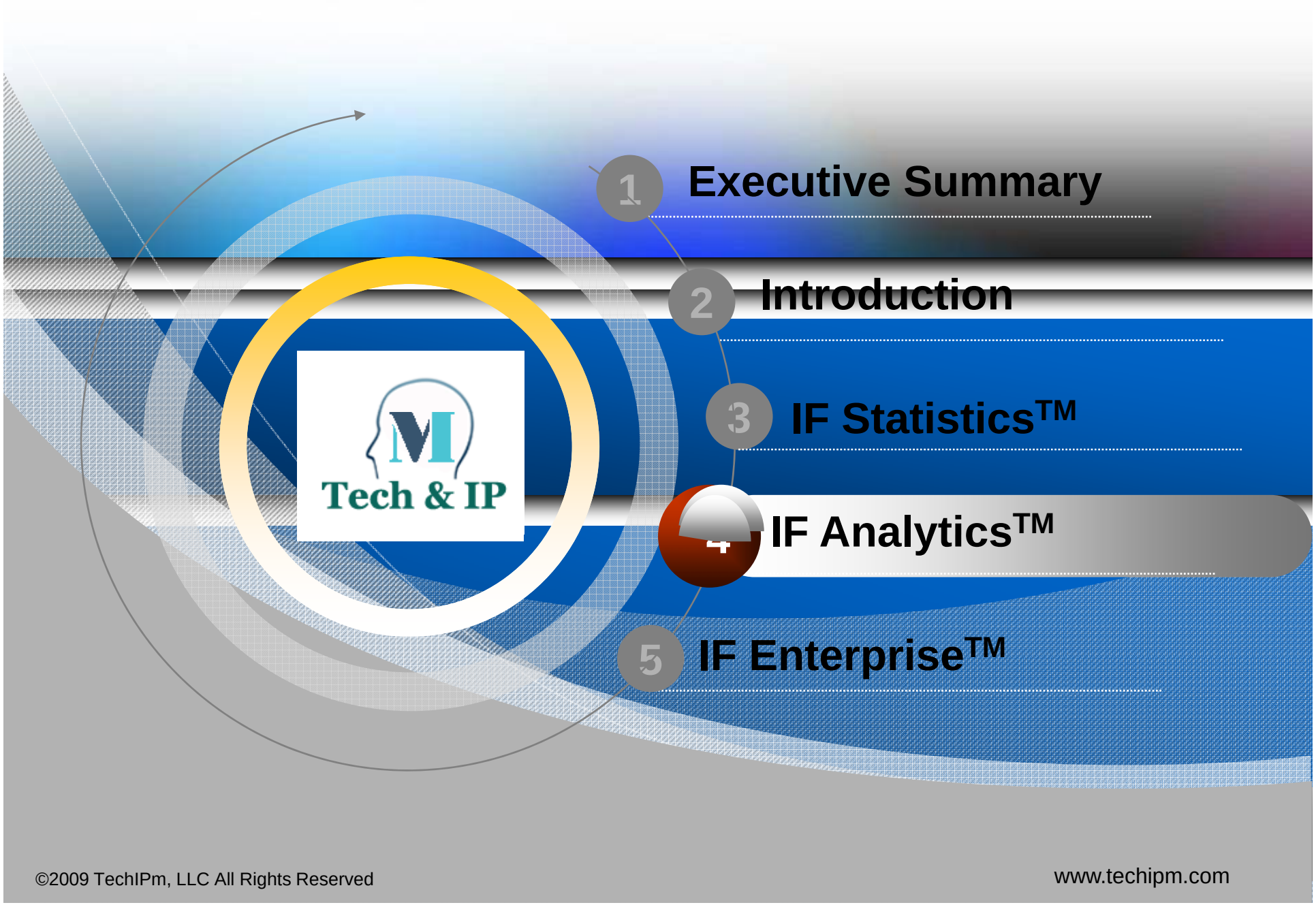

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4.1 Customized Classifications Used in RFID Innovation Frontline™ -4

Market Sub-classes for Application Class:

- Retail: shopping cart conveyor, marketing system, self-service checkout device
- Healthcare: Drug delivery management system, orthopaedic component
- Logistics: container monitoring system, shipping pallet
- Transportation: passenger door open request system, parking system
- Security: theft protection system, portable security alarm
- Asset Management: library monitoring system, inventory control system
- Manufacturing: parts assembly management system, system for manufacturing control
- Entertainment: card game monitoring system, apparatus for identifying a golf ball
- Financial Service: ATM, device for digitizing checks

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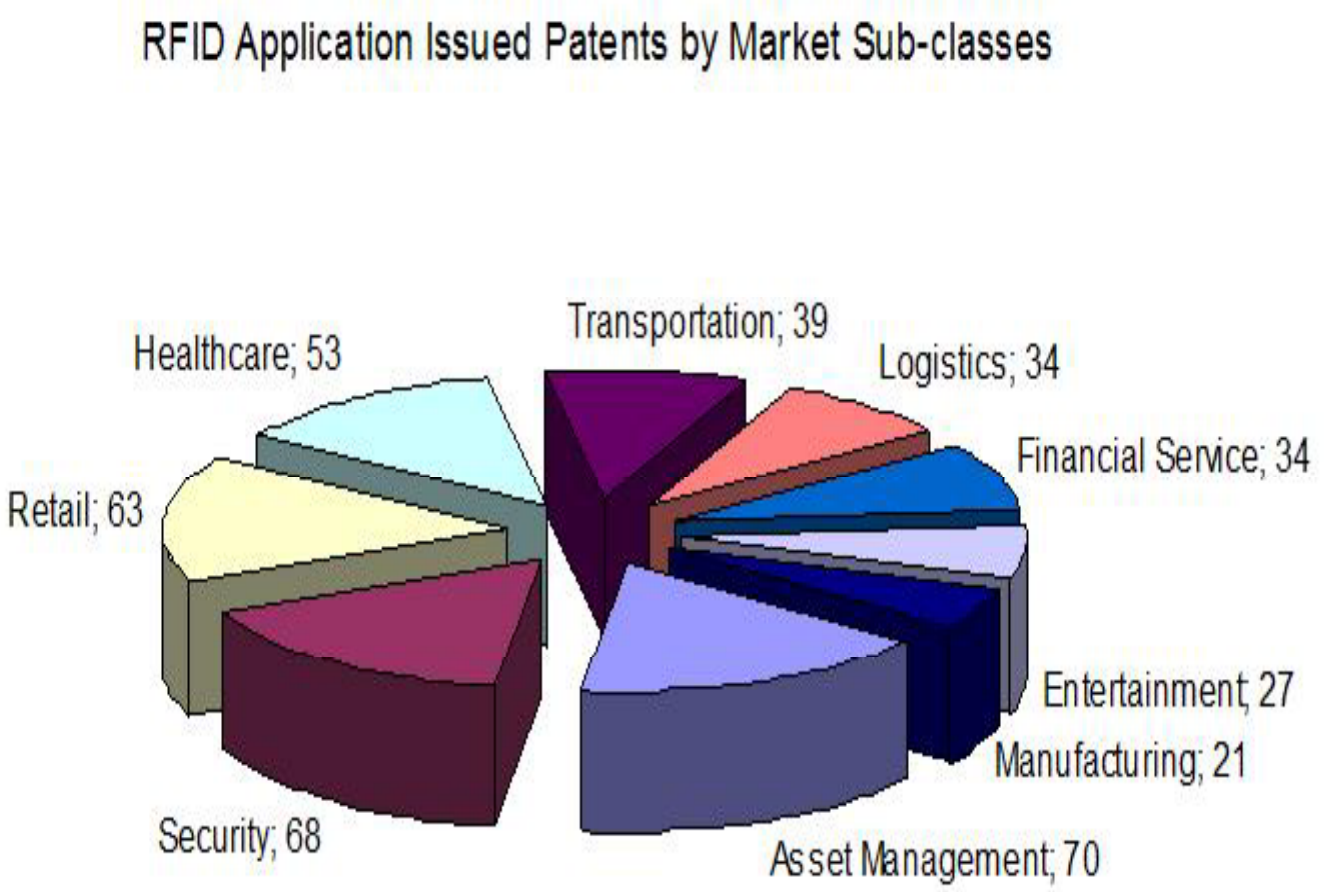
Fig 4.1.9 Distribution of patents among market sub-classes



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4.5 PFS vs. CPP Matrix

A chart for PFS vs. CPP matrix may be used to show a quality landscape for a specific class relative to others. A specific class located in the upper right corner of the matrix chart (high value both in PFS and CPP) may can have competitive advantage compare to other classes in developing a successful market globally.

Fig. 4.5 shows PFS vs. CPP matrix for the customized classifications of RFID patents

Key interpretation: tag antenna, tag architecture, and reader protocol may need to develop more international families

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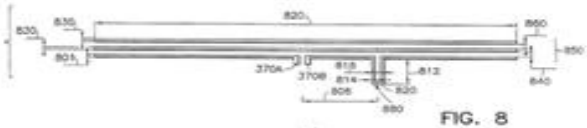
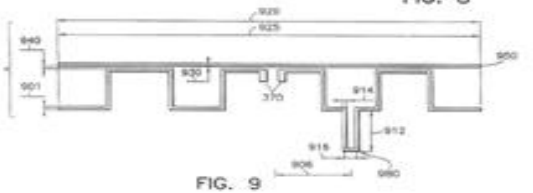
4.6 Technology Development Snapshot for UHF Tag Antenna

Technology development snapshot for a focused field of technology shows historical view of a progress in innovation. Technology development snapshot in UHF tag antenna shows application/issued year, issued number assignee, title/abstract, and drawing in a time series of table contents.

Application Year Issued Year	Patent Number Assignee	Title Abstract	Drawing
1997 2000	6028564 Intermec	Wire antenna with optimized impedance for connecting to a circuit An antenna used as a voltage and power source is designed to operate with arbitrary load, or front end. The antenna has one or more (number of) loading bars that are placed adjacent to the elements of the antenna at a spacing distance. The real part of the antenna input impedance is changed by adjusting the loading bar length, width, and/or spacing distance and/or the number of loading bars. These changes are implemented to reduce the real part of the antenna input impedance to make it small enough to develop an adequate voltage, Vp, to operated the front end and connected circuitry. In a preferred embodiment, the real part of the antenna input impedance is reduced to the point at which Vp no longer increases. One or more stubs is added to one or more of the antenna elements. The stubs act as two-conductor transmission line and is terminated either in a short-circuit or open-circuit. The short-circuit stubs act as a lumped inductor. The open-circuit stub acts as a lumped capacitor. The magnitude of these lumped capacitors and inductors (reactances) is affected by a stub length, a stub conductor width, and a stub spacing. Zero or more short-circuit stubs and zero or more open-circuit stubs are added to one or more of the antenna elements to change the reactive (imaginary) part of the antenna input impedance. In a preferred embodiment, the reactive part is changed to be equal to the negative magnitude of the reactive part of the front end input impedance. For a given real part of the antenna impedance, Ra, this approach maximizes both the DC voltage generated from the input and maximizes the power transferred between the antenna and the front end.	 FIG. 8  FIG. 9

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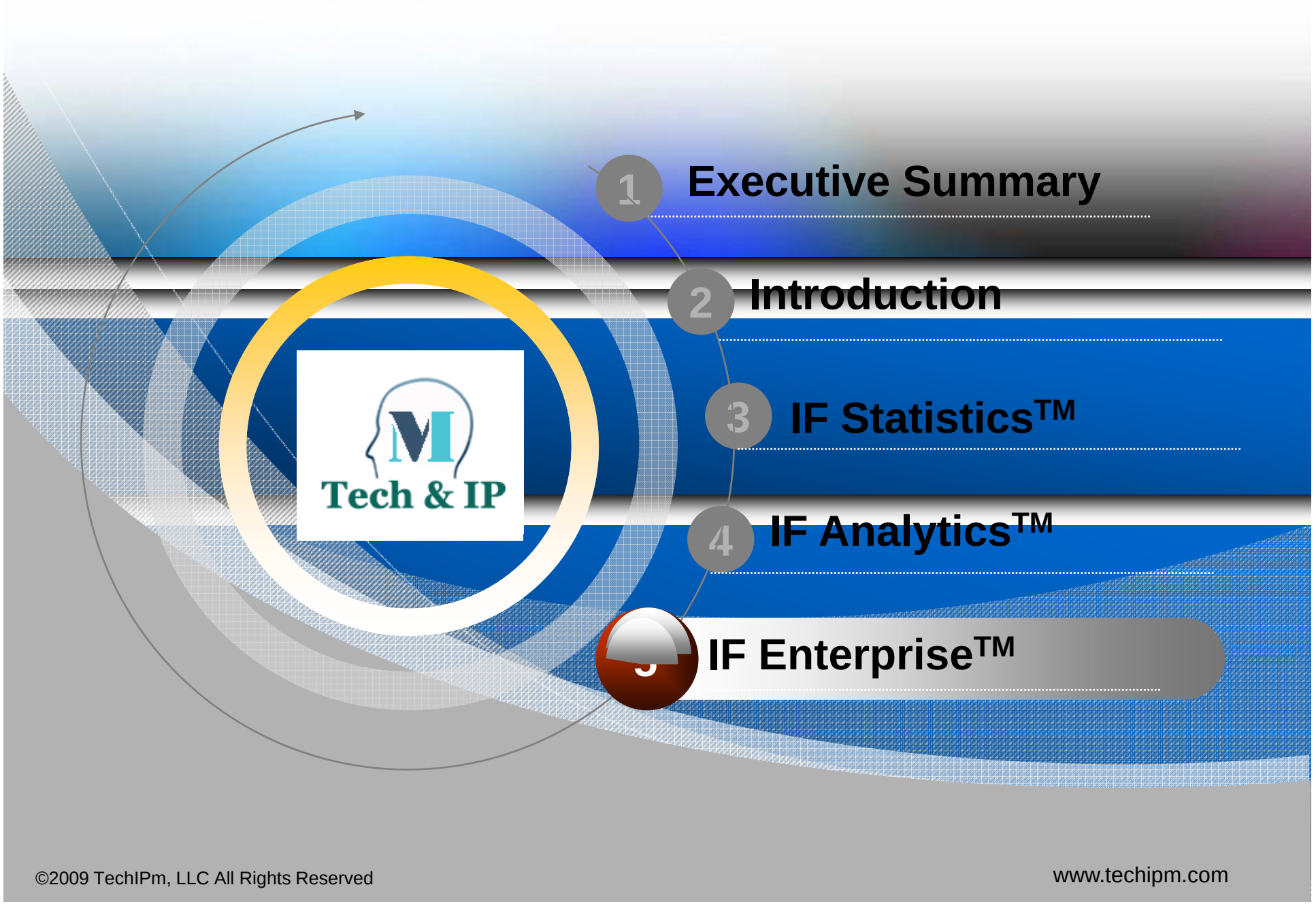

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Fig. 5.2.1 Top 10 assignees' RFID patent portfolios

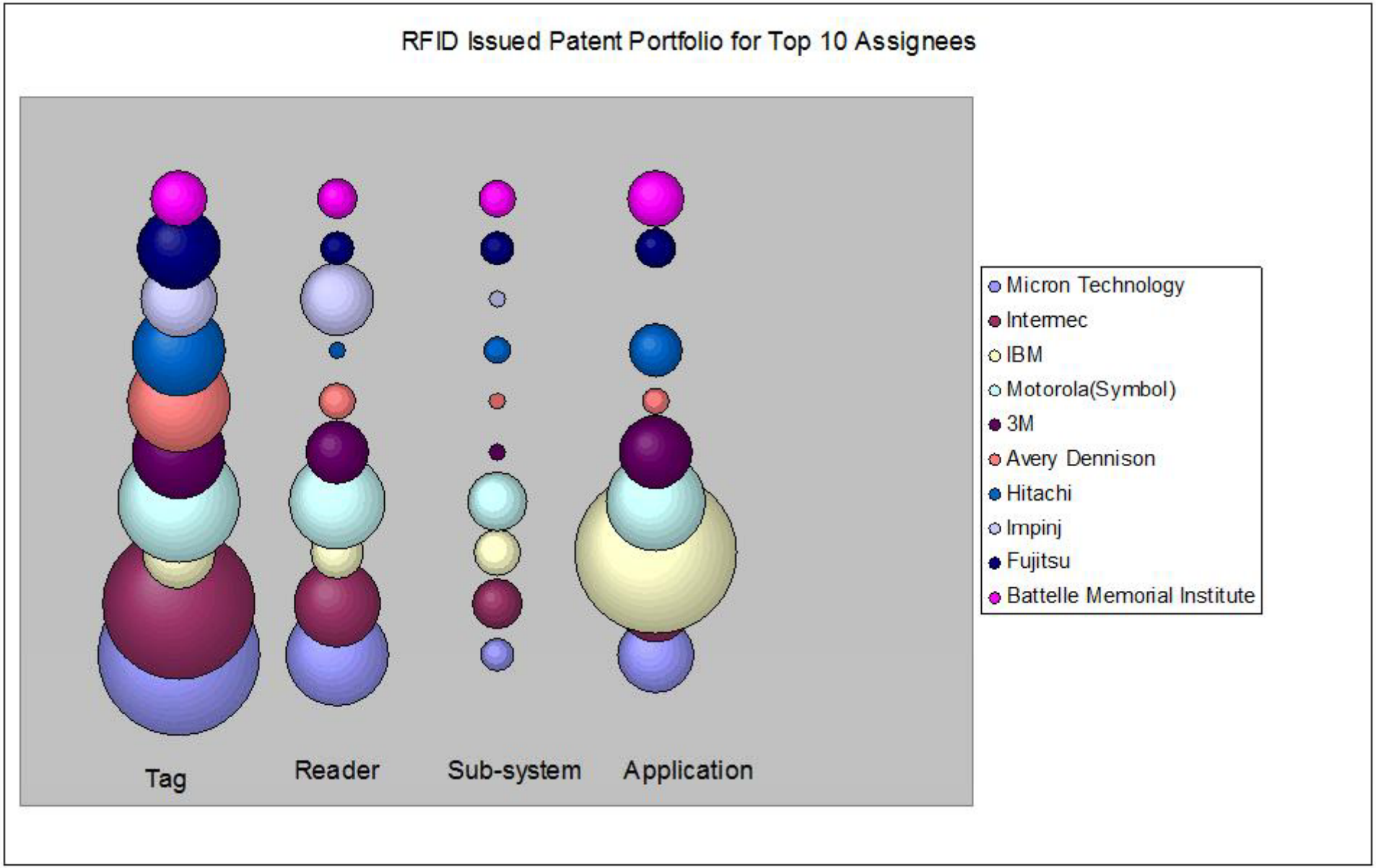

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Fig. 5.2.2-6 Top 10 assignees' patent portfolios for reader protocol

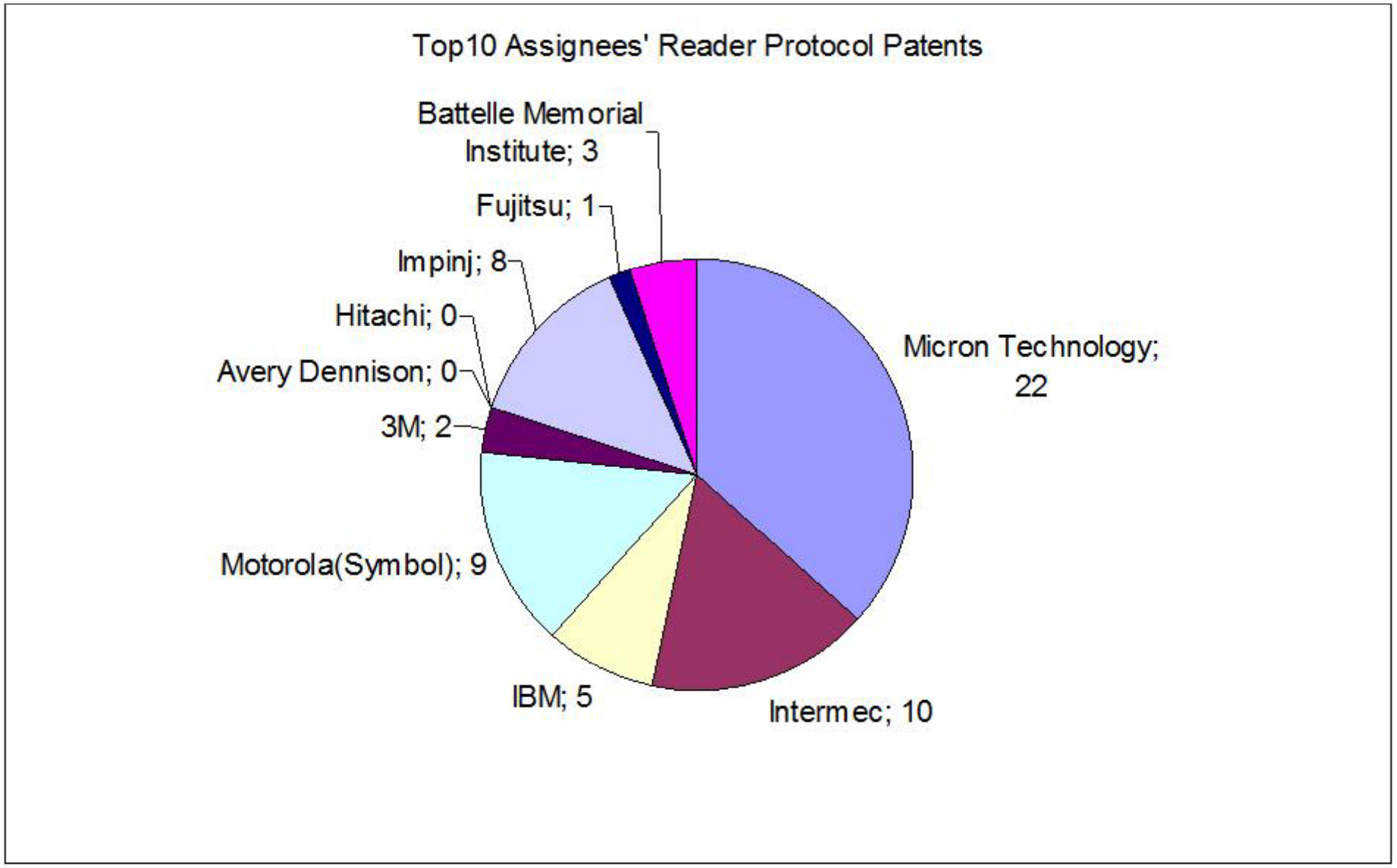

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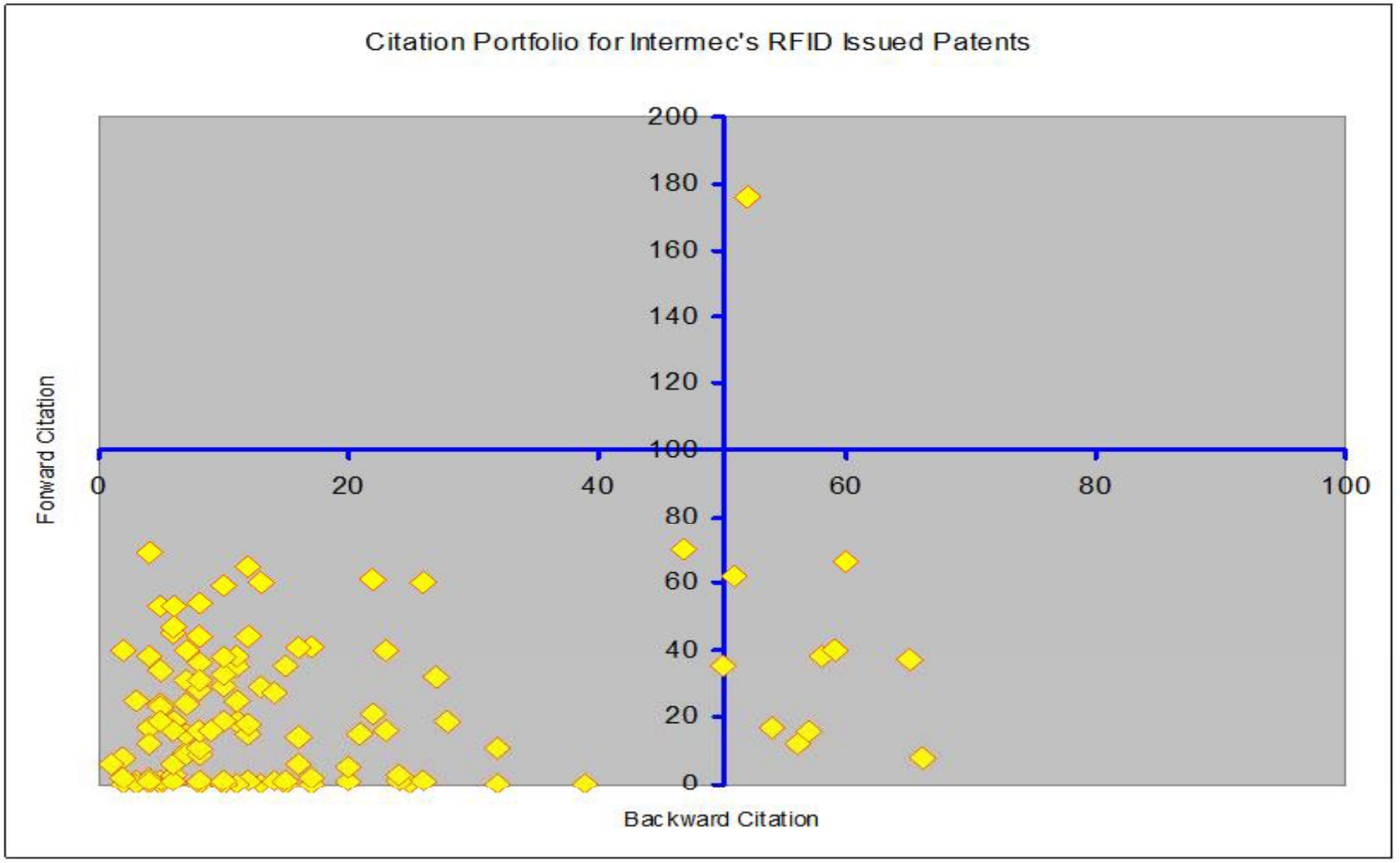
Fig. 5.4 Citation portfolios for Intermec's RFID patents



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5.5 Competitor Analysis: Intermec vs. Motorola

Fig. 5.5 shows a comparison in RFID patent portfolios between Intermec and Motorola.

Key interpretation: Intermec and Motorola have a very similar patent portfolios

as Motorola merged with Symbol

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Thank you!

If you have any questions

please contact

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