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Cover Page Footnote

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PIUG: Patent Information Users Group, Inc.: A History of The International Society for Patent Information Professionals

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Abstract

Efforts to view and analyze patents began soon after the first patents were filed in the novel system founded in the U.S. Constitution. In the succeeding 200 plus years, classification and indexing tools have evolved from paper to digital, with searching demanding ever-higher skills. Answering the need of patent researchers and analysts for advocacy, scholarship, and professional education, leading searchers founded the Patent Information Users Group, Inc., now the pre-eminent professional organization for patent searchers in the United States. It offers formal coursework for prospective patent searchers, colloquia, and conferences where novice searchers can master their craft. Searchers, who often work in isolation, benefit from the support network and collegiality of PIUG. Patent searching is both challenging and rewarding. It is vital for individuals seeking to secure rights to intellectual property and contributes to research in many fields: history, economics, finance, management, sociology, law, medicine, and government policy. It is a career path for academic and special librarians with knowledge of the sciences behind the inventions and is a core skill for those preparing for careers in the sciences and technology fields. Skills and applications for patent knowledge receive little treatment in college curriculum, leaving it to the individual to discover the range of tools, strategies, and practical uses of patents. This article describes the developments in patent searching technology and the work of PIUG's founders and members that led to its creation, growth, and successes in professional education, advocacy, and outreach. *Keywords:* PIUG, patent searchers, professional education, librarians

Who Are the Patent Information Professionals?

Martin Wallace, then PTRC librarian at the University of Maine and recipient of the Patent Information Users Group's Brian Stockdale Award, posted a question on the Patent Information Users Group (2017) (PIUG) website: "How to become a patent information professional." The PIUG is the place to start. The full responses he received are archived here: https://wiki.piug.org/display/PIUG/How+to+Become+a+Patent+Information+Professional

Patent searching and intellectual property management may not be a career option checkbox in the high school guidance counselor's office, or even the college's placement office. So how does one become a highly paid patent information professional? Is there a college major or degree in patents?

Actually, the top searchers' and analysts' careers are founded on substantial formal education in the fields where patents are critical to business success: microbiology, genetics, health sciences, chemistry, electronics, electrical engineering, energy, computer science, artificial intelligence, transportation, communications, to name a few. Only when the pathways of problem-solving in these fields are understood can the relevant developments in intellectual property be identified and analyzed. From there, patent searching skills are developed through the mentorship of experienced searchers, a professional searching course, possibly becoming a patent agent, and ultimately an apprenticeship with a patent information professional.

Beyond their subject matter expertise, professional patent searchers provide data to evaluate the current and future market value of the intellectual property interests of inventors, manufacturers, business planners, investors, and economists. This includes dates of priority, payment of fees, terms and extensions of terms, jurisdictional coverage, families of related patents, description, claims, assignment, encumbrances, licensing, litigation, competitor and market landscaping. Their professional opinions guide patent portfolio management and business development.

Some work independently for individual clients (inventors, lawyers, and businesses). Others are employed full-time for intellectual property law firms, or research & development-focused businesses such as pharmaceuticals, technology, energy. Some are or have been patent examiners or government policy advisers. Some support in-house technology transfer offices in larger universities that prosecute patents resulting from the work of researchers and faculty. Often, top searchers are also registered patent agents.

Among the employers of current members of the Patent Information Users Group are manufacturers' IP offices (Corning,), crop science businesses, pharmaceutical R & D (GQ Life Sciences), chemical development & manufacturers (DuPont), national patent offices (USPTO), energy (Bates), academic IP (UMass Amherst, UWisconsin), environmental sciences (Harbor Consulting), electronics/computing (IBM), engineering (Siemens). According to Indeed (https://www.indeed.com/), jobs for patent searching and analysis with this kind of specialist knowledge are posted with salaries ranging from $40,000 to $140,000, with similar numbers reported by Payscale (https://www.payscale.com) and Glassdoor (https://www.glassdoor.com). Opportunities and salary levels are strongly influenced by location, with certain sectors (e.g. computer technology, petroleum, pharmaceuticals, automotive) concentrated in a few geographic areas.

Skilled patent searchers built their professional organization as patent information became part of the digital revolution.

Dawn of the Information Age

At the dawn of the Information Age, professional patent searchers welcomed the future: patent information that could be searched and transmitted via computers. Each evolution of computer hardware, software, data files, and communication protocols, was met with excitement (with some anticipation and dread). How much time could be saved! What information would be missed and what additional tools made available? Would the system be stable and integrated with others, and, critically, what investment would be necessary?

The United States Patent and Trademark Office (USPTO) had been experimenting with computer assisted classification and search. In October 1972, Patent Office representatives informed the Information Retrieval Committee of the American Patent Law Association of the following:

> In the case of mechanized searching projects, there have been no cutbacks in funds or staff, but funding of any major new projects is being held in abeyance pending a study by the Computer Sciences Division of the National Bureau of Sciences of Operation Potomac [Patent Office Techniques of Mechanized Access and Classification], the project to create a data base of the full text of 1.8 million U.S. patents in machine form and to develop programs that would enable this data base to be searched by computer (Brenner, 1972).

A statement presented at the same meeting by Jacob Rabinow[1], Chief of the Office of

(Lemelson-MIT Program, n.d.). One cannot help but consider the prescience of his words, in light

[1] Rabinow earned 229 patents, over a wide range of technologies, including several computer-related inventions still relevant today.

Invention and Innovation, National Bureau of Standards, raised doubts about computerized searching:

> I think that nearly all efforts to mechanize patent searching are doomed to failure. I have said this on three occasions in the last eighteen years. I say it again: that the present breed of computers cannot do searching of patents. It can do a great many other things, which it should do. It should enable you to get hold of a particular patent instantly, that is, within a second or two. It should enable you to — if you want to cross a file — to get it in any form, shape, kind you want. You should get printouts. All the dogwork that is done in the Patent Office, all the moving around of things that can be done by computers, by microfilm, by all the modern techniques.
>
> But the search, the intellectual part, is not the same kind of thing. It is like translating from one language to another. This is not a machine process today. Whether it will be in the future or not, I don't know. Today, no computer, no computer system, of any size whatever, organized as computers are organized today, can do this kind of thing (Brenner, 1972).

First Light on Computerized Searching

While "mechanized searching" of patents was being debated among lawyers and government experts, utility patent applications arrived at the USPTO at the rate of over 100,000 per year (and growing), and new grants exceeded 70,000 annually (Patent Technology Monitoring Team, 2019). The patent searcher's task had become monstrous. Potentially relevant patent documents were identified by monitoring the Official Gazette and published general indexes of patents and classifications, comprehensive but cumbersome. Some specialized commercial and government agency abstracting and search tools, were available for fields such as chemistry, pharmaceuticals, metals, ceramics, polymers, rubber, plastics, engineering, and government patents. The patent numbers thus identified would then be used to retrieve patents on microfilm, bound volumes, or individual paper copies.

Meanwhile, in 1960, Roger Summit (then a doctoral student at Stanford University) had taken a summer job at Lockheed Information Sciences Laboratory, where he worked on the challenge of information retrieval. By 1964, Summit was leading a team in a Lockheed laboratory that developed a prototype of the system later known as DIALOG Information Service (Milestones: DIALOG Online Search System, 1966). Throughout the 1960's, many academic, government, and commercial laboratories developed information retrieval systems that relied on telephone connections via acoustic couplers, typically transmitting at 10 or 15 characters per second, with output printed via teletype on continuous rolls of newsprint (Bourne & Hahn, 2003; see also Berg, 2017).

Many of the larger industrial businesses and intellectual property law firms kept a deep bench of very able patent searchers, generally with academic credentials in the relevant technologies, experience at the USPTO, and research fluency. These searchers were early adopters of computers for information management. They kept up-to-date on the latest developments in patent information and tools by participating in training at conferences on patent information and non-patent literature (NPL) sponsored by content producers, and database search system vendors (such as DIALOG, Chemical Abstracts Service (CAS), STN, Derwent, IFI, INPADOC, Orbit, Questel, Mead Data, FIZKarlsruhe, IEEE, and ASME). Vendors offered different search codes for different portions of databases (chemical fragmentation codes, subject-

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of current day developments in artificial intelligence and intellectual property.

specific codes), largely designed for punch card sorts. Subscribers purchased only the tools they expected to use and trained only a small staff to use them (personal communication, Edlyn S. Simmons, January 29, 2020). In 1987, Derwent (patent data and analysis developer) released World Patent Index on Orbit (search engine). Current subscribers were able to experiment and evaluate the new tools. Monty Hyams and the Derwent staff recognized the value of the feedback that the users provided at the 1987 American Chemical Society Regional Conference. Committees were established to present recommendations, some of which were incorporated. Others were resisted, such as the idea to preserve links to the former chemical fragmentation codes when a new system was introduced, and add the new codes to backfiles, allowing unified searching of both (E. S. Simmons, 2004). It was an age of discovery for searchers.

As database developers sought to leverage their areas of expertise and existing market, vendors featured individual databases at conferences and provided little opportunity for patent searchers to discuss a range of products and searching techniques (Feider & Simmons, 1988, May). Later, aggregators combined databases from various developers in subscription baskets. Some database creators maintained control of core elements. Productive collaboration was difficult (Kaback, 1988). The federal government's effort to limit the commercial republication of public domain information threatened the enhanced access that the DIALOG database was providing (Morton and Zink, eds., 1988; see also Bjørner & Ardito, 2003a, 2003b, 2003c, 2003d, 2004a, 2004b, 2004c, 2004d, & 2005). Users saw roadblocks to making efficient use of the various databases and tools, and costs were rising (Basch, 1998; Kaback, 1991). The providers saw a potential loss of decades of investment in data collection, organization, management, and tool development (generally known in the trade as "intellectual property") if others could piggy-back onto their refined system; everyone understood the very short shelf life of IP knowledge. It was an "age of anxiety" for searchers (Lambert, 1991).

Organizing Professional Searchers

Following the American Chemical Society's Central Region meeting in Columbus, Ohio, in June 1987, patent searchers Fran Rosenthal, Edlyn Simmons, Michael Feider, and Suzanne Elsoffer met for an informal dinner at a nearby restaurant. Each was an expert in highly specialized fields (petroleum, pharmaceuticals, chemistry, polymers, minerals, etc.), but all shared common concerns (Rosenthal, et al., n.d.). Changes were occurring in the search tools they depended upon, without input from professional searchers. Commercial database producers were changing the availability of tools and content. The Patent Office was developing an automated patent system that threatened public access to search resources at USPTO. Expert patent searchers wanted a place where they could share news, strategies, resources, and professional education, and an organization that would represent the goals of professional patent searchers in discussions with the providers (Lambert, 1991). Recalling her involvement with the Cincinnati Online Users Group, Fran Rosenthal suggested that the patent searchers model their association accordingly (Rosenthal et al., n.d.).

The concept for the Patent Information Users Group was born that night, out of a desire to speak with a unified voice, separate from the database vendors and producers. Edlyn Simmons recalled that on January 4, 1988, Mike Feider wrote a letter to information managers at some major U.S. corporations, "listing some of the issues and asking whether the recipients would support formation of a patent information users organization" (Rosenthal et al., n.d.). With some positive responses, a second personal letter was mailed inviting the searcher community to an organizational meeting (Rosenthal, et al., n.d.), and a letter to the editor at *Online* magazine was published in May (Feider & Simmons, 1988). Although Stu Kaback was unable to attend the May 1988 meeting, his letter to the editor (also published in the May 1988 *Online* magazine) highlighted the problems of recent practices of segmenting databases (Kaback, 1988). (According

to Poynder (2002), Stu had been initially skeptical.)

Following the IFI [Information for Industry, Inc.] Users meeting on May 19, 1988, the group gathered at the Stouffer Concourse Hotel, Crystal City, Virginia, with 17 people attending. *Pro tem* officers were Mike Feider (Chair), Nancy Lambert (Secretary), and Pat Dorler (Treasurer) (Rosenthal et al., n.d.). Joe DiSalvo created a membership directory and began a newsletter while Elyse Robinson took charge of setting up a DialMail bulletin board (Begin Mail!, 1985) for PIUG communications (Lambert, 1991). At the Orbit Users Days (Bethesda, MD) in September, 1988, a handful of interested searchers (Pat Dorler, Elyse Robinson, Stu Kaback, and Fred Morgan) met and made preliminary plans for membership requirements and dues (Rosenthal et al., n.d.). The initial operating structure included committees for each of the major database producers and vendors, monitoring activities, and an annual business meeting for members (E. Simmons, 2018). The group next met following the May 1989 IFI Users Conference in Crystal City, Virginia, where 29 attended. There were now 75 members on the mailing list and 50 participating in the DialMail bulletin board (Rosenthal et al., n.d.). It was a time for teamwork.

Growing a Professional Patent Searching Community

One of the first tasks for the founders was to decide who should be members of the new group, generally known as PIUG. The focus was on those at the front lines of patent information work, the patent searchers, interested in the full range of data, search tools and strategies, analytical methods, and presentation of results. The mission of PIUG is "to support, assist, improve and enhance the success of patent information professionals through leadership, education, communication, advocacy and networking" (Patent Information Users Group, Inc., 2020e). A first principle of the PIUG is that membership is open to any individual with "an interest in patent literature, patent searching, patent analysis and patent databases" (Patent Information Users Group, Inc., 2009). Initially, those representing database producers and vendors were excluded (Lambert, 1991). Dues would not be a barrier to membership, at $10 annually.[2] (Rosenthal et al., n.d.).

The DialMail bulletin board was a pragmatic way to coordinate the plans of this new group, with messaging, document exchange, and newsletters, starting with the first meeting. Perhaps more importantly, it was a virtual link to connect these highly specialized experts who often lived and worked far from their peers. The bulletin board became a rallying point for its members' causes, including: news about new or changing patent databases; problems with software and hardware; and gripes about policies that made little sense. Practical advice (such as best practices for loading new content) was sorely needed as digital resources and formats proliferated. Now there was a place to find colleagues and answers (Lambert, 1991; Rosenthal, et al., n.d.).

PIUG business meetings helped develop professional friendships, where the formalities were accompanied with networking, collegiality, and wit. Founder Nancy Lambert continued a highlight from pre-PIUG meetings: the IFFI (sometimes IFFY) Players, with searchers–turned–thespians (Linder, 2015). Nancy abridged classic plays such as "The Importance of Being Earnest," and scrounged props.

Then, one year, Richard Kurt was playing Colonel Pickering opposite Stu Kaback as Henry Higgins in "Pygmalion." Stu wasn't expecting improv comedy when Richard ad-libbed, replacing his line, "I just came from India to meet you" with "I just came from the Patent Office to meet you." Patent improv grew among the cast, and

[2] In the succeeding 35 years, dues have been kept affordable. Currently, annual regular membership is $95, discounted to $50 for students, retirees, unemployed searchers, and members from emerging countries. Additional discounts are available for those choosing automatic renewal.

eventually Nancy created fully patent-themed parodies for each year's production (Lambert, et al., 2007). It was a time for camaraderie.

When internet connections became available, communications evolved from the DialMail bulletin board to a listerv. The PIUG website launched in 1996, and the PIUG-L listserv was replaced with a web-based discussion list, PIUG-D. This was later replaced with a Discussion Forum, which allowed better organization of topics. In keeping with the "open" model, both members and non-members could participate in these online discussions. Recently, these exchanges have been made a part of the website's Forum pages. The public continues to have read access to the postings, which are internet searchable, enhancing access to timely information, with about 1,400 participants, from both the U.S. and abroad. A separate Jobs Forum allows patent-focused positions to be seen quickly by highly qualified searchers (Patent Information Users Group, Inc., 2020d). Committees and Officers can work via dedicated forums. PIUG member Thomas Wolfe is the webmaster who tests, selects, and implements website improvements and features (Wolff, T. E., 2009; Wolff, T. E., 2010).

Shining Light on 21st Century Patent Information

Best practices in patent information searching skills, strategies, tools, and analytics change from week to week. PIUG has consistently provided current newsletters, conferences, and formal instruction while its members have contributed significantly to the published body of knowledge for patent information and searching. These publications include professional-level books and articles to guide novice searchers (Adams, S. (2012); Alberts, D., et al. (2014); Clarke, N. S. (2018); Hunt, et al. (2007); Lambert (1995b); Trippe, A. (2015)). See the attached Appendix for additional examples.

Searchers need frameworks within which to search, particularly as fluency and specialization develop. Standards for information literacy have been set by professional organizations in chemistry (American Chemical Society (Committee on Professional Training), 2015a; American Chemical Society (Committee on Professional Training), 2015b; see also Chemical Information Sources/Chemical Patent Searches, 2019 [referenced by ACS standards]). Those working in chemistry patents can get help from Simmons & Kaback (2005) and White (2014). To explain examiner search strategy, one might take a look at Demarco's slide set (2017). When working with scientists and engineers doing research and development, consider *Fundamentals of Patenting and Licensing for Scientists and Engineers* (Ma, M. Y., 2009), predating the America Invents changes, but addressing many core concepts. The Institute of Electrical and Electronics Engineers (n.d.) offers a downloadable e-book on the value of non-patent literature. Anthony Trippe's several articles in the Appendix provide excellent guidance for sophisticated engineering patent searching. Henriques's recent article treats prior art searching (2019) while Meier (2012) provides a useful description of elementary patent searching in engineering and checklists for selected information literacy in patents for engineering students. In addition, Association of College and Research Libraries (2006) provides information literacy standards.

Formal educational endeavors began quickly for PIUG, sponsoring a colloquium on the implementation of CD-ROM patent media in 1990. In addition to hands-on classes, PIUG now offers virtual classroom training through webinars and self-paced recorded programs (Patent Information Users Group, 2020f). Live PIUG classes have been conducted at the American Chemical Society (Philadelphia, Pennsylvania), USPTO (Alexandria, Virginia), and Genentech (South San Francisco, California). Courses include:

Introduction to Patent Searching

Patent Searching Fundamentals

Freedom to Operate Fundamentals

Patent Analytics

Patent education with a broad brush happens at PIUG conferences. Members from

Pennsylvania and New Jersey organized the first "Northeast Conference" in Princeton, New Jersey on March 30, 1992. This began a long tradition of an event focused on chemical, electrical, and mechanical patents, PIUG's first technical program with contributed papers. In 1995, technical sessions became a regular event with the annual business meeting, which grew to multi-day events in 1998 (E. Simmons, 2018). As vendor/subscriber conferences ceased, PIUG's annual conference grew to multi-day events (Davis, S.K., 2009).

In 2000, PIUG Conference was held on the West Coast for the first time. Since then, annual conference locales have included:

Costa Mesa, California;

San Antonio, Texas;

Baltimore, Maryland;

Cincinnati, Ohio;

Denver, Colorado;

Garden Grove, California;

Lombard, Illinois;

Vancouver, Washington;

Atlanta, Georgia;

Alexandria, Virginia.

Four hundred attended the 2000 annual conference, and over 700 have attended one or more conferences in the past five years. In 2007, an annual biotech-themed conference in the Boston area was added (Patent Information Users Group, Inc., 2017). PIUG delegations have also participated in conferences in Beijing, China (PIUG-PIAC). Members have heard about the Japanese Patent Search Grand Prix, where two PIUG members had the fun and challenge of competing against highly skilled Japanese searchers (2016 Annual PIUG Conference). Recently, PIUG has developed a certification process for Patent Information Professionals, something existing in a number of other countries to identify searchers with high skill levels (Hantos, S. 2019).

PIUG is an international organization. Its members are patent searchers in the United States, as well as members joining from the U.K., Australia, India, Israel, China, Japan, South Korea, Canada, France, Belgium, Austria, Switzerland, Sweden, and Italy, among others. PIUG collaborates with patent experts and government patent offices around the world. Speakers from the USPTO regularly present at PIUG conferences on current initiatives. A cooperative memorandum of understanding was signed in 2008 with the Confederacy of European Patent Information User Groups (CEPIUG) (Darmon, A.-G., 2009). PIUG authorized a Chinese subchapter in 2010. In 2015, PIUG was granted observer status with the World Intellectual Property Organization (Patent Information Users Group, 2017). This is a time for world-class learning for searchers.

Celebrating the Stars of Searching and Empowering the Next Generation

Recognizing the achievements of members of a professional community provides valuable guidance and support for others. Patent Information Professionals often work behind the scenes, even in the midst of major research and development firms, making this even more important. Often awards are sponsored by or named in honor of the superstars of patent information.

Stu Kaback was a founder of Patent Information Users Group, as well as a force to be reckoned with. He argued vehemently for database and indexing improvements needed by patent searchers. His technical expertise in patents for ExxonMobil demonstrated the contribution a patent information professional makes to the success of a business. He received the 2001 IPI Award and the 1999 ACS Herman Skolnick Award for outstanding achievement in chemical information. After his death in 2012, PIUG honored his memory with the Stu Kaback Business Impact Award for patent information professionals whose work has had a significant impact on the success of their organization (Patent Information Users Group, 2020g). Recent recipients include:

Carol E. Bachmann (2013)

Yun Yun Yang, Jonathan Lippy, and Thomas Klose (2014)

Andrea Davis (2015)

Cynthia Gallagher (2016)

Alfred Yip, Anthony Trippe, Dr. Huang Jinquan, Dr. Koh Yung Hua, Dr. Xie Rongguo, Dr. Annabelle Lim, Dr. Eu Zhi Ang (2017)

Amy De Coster and Janet Larsen (2018)

Representing Dr. Brian Stockdale's lifelong commitment to educating, coaching, and mentoring patent searchers, PIUG funds a one-year membership and attendance at an annual conference in his honor (Patent Information Users Group, 2020a). Brian Stockdale Award recipients are given opportunities to present at annual conferences, as well as helping them network with experts. Librarian Recipients of this award include the following:

Svetlana Korolev – University of Wisconsin, Milwaukee (2002)

Meredith Saba - University of California, Davis (2006)

Martin Wallace - Raymond H. Fogler Library, University of Maine (2007)

Jody Hoesly - University of Wisconsin, Milwaukee (2012)

Justin Foley – University of Michigan (2013)

Barbara Hampton – Sacred Heart University (2015)

Youngbok Ryu – New Mexico Tech (2017)

The IPI Award was established and sponsored by Technology and Patent Research International (International Patent Information Award Hall of Fame, 2019). It recognizes "individual contributions towards the advancement of patent information and related disciplines, and to the patent information world in general." PIUG members have been recipients on several occasions:

Mr. Montagu Hyams (2000)

Dr. Stuart Kaback (2001)

Ms. Edlyn Simmons (2005)

Ms. Nancy Lambert (2008)

Mr. Stephen Adams (2012)

Dr. Sandra Unger (2013)

Dr. Tsutomu "Ben" Kiriyama. (2018)

Ms. Bettina de Jong (2019)

Many other PIUG members have contributed to the body of knowledge for patent information and searching. They are recognized in an Appendix following this article. This is a time for honor.

Back to the Future of Patent Information

In 1972, Jacob Rabinow hinted at the future of artificial intelligence, noting that searching was an intelligent operation, not the mechanization offered by computers of that day. "This is not a machine process today. Whether it will be in the future or not, I don't know" (Brenner, 1972). Forty-five years later, this is a hot topic in patent searching, one that is being discussed and debated at PIUG conferences and in published research.

In 1999, Stephen Adams refuted the idea that the information consumer/client did not need an intermediary (expert searcher) to conduct an appropriate search for patent information. Sooner or later, those who have served as such intermediaries have encountered resistance from an information amateur with expressed or internal thoughts of "I just want to do it myself," "I can just Google it," or "I already found it" (i.e., the first potentially relevant lead that came to their attention) (Kaminecki, 2012). One can imagine the budgetary axe falling on some patent information professionals when the clients can't remember what those folks with the desk and computer in the back corner actually do. A recursive program of client re-education has always been needed.

In his 2018 paper, Adams revisited the potential and the problems of computerized searching. He identified the many parts of the data that are not digitized at all, or not completely, and the great human variation in the expression of ideas in patents that necessitate an "art" of searching, not simply a "science" of searching (Adams, 2018). Trippe & Ruthven (2011) describe a method for evaluating the effectiveness of patent retrieval systems. Consider a computer's ability to describe the indescribable—innovations lacking a noun to describe them! (Goers, B., et al., 2018). Future top-level professional patent searching will depend upon first, the searchers' fluency in the subject matter of the patent. Many students today eschew education in the sciences and technology, even at a basic level. They will be unable to imagine the many shades of innovation in a technical patent.

Second, the value-added patent search has been made feasible by the ability to data-mine and cross-search data from many sources and many perspectives, including patent prosecution (Alcacer & Gittelman, 2006). Patent landscaping has made it easier to understand the implications of the data (Pargaonkar, 2016; Smith, Arshad., Trippe, Collins, et al., 2018a and 2018b; Trippe, 2015). However, the results of the search are defined and evaluated by the question that is asked. It requires human intelligence to conceive of questions that have not been asked (Kong, Zhou, Liu, and Xue, et al., 2017; Yang, Akers, Klose, & Yang, 2008).

A top-level searcher can envision useful data that can be extracted from patents and other sources, not only to answer questions asked by businesses, investors, health scientists, policy-makers, educators, and others, but also to generate novel interesting questions of her or his own. As of today, computers can only generate those questions that a human has programmed to be asked. Implicitly, one's digital television system may seem to be asking "Would you like to watch this movie?" by showing an icon for that movie. However, that is merely a statistical possibility based on data that the viewer has entered directly or on prior choices, and the parameters set by the programmer. It does not know and cannot conceive of the multitude of factors that might make that movie an object of desire or an object of revulsion, and it utterly lacks the creativity to describe a new form of entertainment for the viewer.

With all the computerized tracking of people, family, neighbors, locations, activities, purchases, opinions, education, health, hobbies, food, entertainment, purchases, travel, associations, . . . a return to Jacob Rabinow's statement from 1972 is in order: "Whether it will be in the future or not, I don't know. Today, no computer, no computer system, of any size whatever, organized as computers are organized today, can do this kind of thing."

And add: only the creative mind of humans can conceive of and evaluate the potential for this kind of automation. This is the future.

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Appendix: Contributions to the Published Body of Knowledge for Patent Information and Searching

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