Recollections of People and Ideas

Fei-Yue Wang, Chinese Academy of Sciences

This special issue marks the 25th anniversary of IEEE Intelligent Systems. Congratulations to the entire staff and all our contributors and readers! It has been an extraordinary journey thus far, and I would like to thank you all for a quarter century of exceptional work and success.

In looking back over the magazine’s history, I understood that today’s achievements would not be possible without the guidance and vision of our past editors in chief; this magazine is a combination of their individual improvements and contributions. Hence, I’ve asked our previous editors to each speak on their experiences at the helm of this publication. After a bit of emailing and help from our Lead Editor Dale Strok, I was able to gather everyone and collect their thoughts. Therefore, I’d like to celebrate this special issue by presenting a few reflections and words from my predecessors:

- David Pessel (david@pessel.com), 1986–1989
- B. Chandrasekaran (chandra@cse.ohio-state.edu), 1990–1994
- Stephen Cross (cross@gatech.edu), 1995–1996
- Daniel O’Leary (oleary@usc.edu), 1997–2000
- Nigel Shadbolt (nrs@ecs.soton.ac.uk), 2001–2004
- Jim Hendler (hendler@cs.rpi.edu), 2005–2008

As for my own words and thoughts on the history and progression of IEEE Intelligent Systems, I would like to save them for our 50th anniversary celebration! On another note, this year there was an overwhelming and enthusiastic number of nominations and discussions on our AI’s 10 to Watch and Hall of Fame projects. However, due to the space constraints of this special issue, the announcement of awardees will be reserved for our next issue.

Once again, thanks to everyone and to our past EICs for contributing to our 25th anniversary issue. I must give thanks as well to members of the Editorial and Advisory Boards for their extraordinary service and dedication. Without their hard work and support, this magazine would not be what it is today.

It’s been a good 25 years; let’s make it a good 50 years and continue to work toward a bright future for our magazine. Let’s continue our tradition of innovation and creative thinking, expand our magazine to new horizons, embrace new technologies such as Web 2.0+ and new social media, and continue our evolution as one of the top magazines for intelligent systems and artificial intelligence professionals.
David Pessel, Founding Editor (1986–1989)

When I was invited to contribute to the 25th anniversary issue of IEEE Intelligent Systems I was a bit taken aback. Has it really been that long? It must have been 27 years ago that we first started discussing having a technical magazine devoted to what we then called expert systems. We were all skeptical; no one thought it would fly, but with a bit of help (blind faith?) from friends, we persisted.

At the time, I was hardly an expert on the subject, although I was nominally responsible for research in this area at what was then the Standard Oil Company (Ohio), which later became part of BP. I say nominally because I’ve always believed that the right things happen faster with great leadership, and not so fast otherwise. Certainly, I was in the not-so-fast lane!

The Computer Society board finally approved the idea, although even today, some probably wonder why. Did this really fit under the umbrella of the IEEE Computer Society? Would anyone read it? It did, and they did!

To begin, we assembled an editorial board, editors, reviewers, special issues, ideas about cover art (yes, we even had puzzles!), and more. IEEE Computer Society Publications Office staff True Seaborn and Bill Faulkner, followed by Henry Ayling, took a special interest in ensuring the success of IEEE Expert. Along with our editorial board, they worked tirelessly on this effort. Space does not allow me to name everyone who helped, but they are all found on those ancient mastheads. I will say, however, that without the persistence and hard work of that cadre of early volunteers and staff, this magazine would have died quickly!

Speaking of dying, I do remember one long debate on a Publications Board meeting about how long this magazine would last. Finally, I asked—perhaps too loudly—would it be so wrong if it did go away in a few years? Wasn’t it part of our mission to try new things? And if commercial publications picked up on it, that was good news, not bad!

I remain a bit proud of what we did. As the field evolved, we changed the name of the magazine a few times (adding the word applications, substituting “intelligent” for “expert,” and so on); this evolution recognized what always happens in new fields. We studiously avoided using artificial intelligence (AI), not only because it was taken, but because we really did want to talk about how capturing expertise might deliver better results.

As Mark Twain once said, “The reports of my death are greatly exaggerated.” Well, IEEE Expert was reportedly dead before arrival many times, but it never really did die! A toast, then, to the IEEE Computer Society for having the guts to let this happen, and to all my successors, contributors, and most importantly, readers for carrying the flag far better than I ever could!

B. Chandrasekaran (1990–1994)

I became the second EIC of IEEE Expert, which had been launched with a lot of vision and foresight under the leadership of David Pessel. The times were heady for AI applications, especially applications based on the technologies related to knowledge-based systems.

I always believed that while applications were important, they were also a route to better theories about the basic research issues. That is, there was a more complex interaction between theory and applications in the AI field than many might at first suppose. The standard account is that the science—the basic research—produces understanding, and engineering and technology follow; they exploit the understanding to produce useful artifacts. In some areas of science, and at some stages of the science, this account is true. Physics in the 20th century is perhaps the best example. However, in some areas of science, applications often provide a wealth of phenomena that provide completely new opportunities for theory making. As Seymour Papert said, “You cannot think about thinking, without thinking about thinking about something.” Since thinking is the subject matter of AI, applications give us domains that give us examples of complex thinking about specific things, so they can in principle provide a wealth of data that theorists can use.

When I became EIC, AI was at a stage ripe for this kind of feedback from applications to theory. The challenge of leading IEEE Expert during this opportunity for the field attracted me greatly. One of the ways I handled this challenge and opportunity was to try to push the articles into spanning at least two levels of abstraction: how the application is actually built and how the underlying technology is used to make things happen as well as a higher strategic level of description so that the reader can see any novelties that go beyond the implementation level. There has always been a tendency in AI to conflate what Newell calls symbol-level and knowledge-level solutions. I tried
to help the authors separate these levels so that the readers could see how the same system might be implemented in a different technology but using the same strategy.

In my view the application focus has led to many new issues being recognized or further developed in AI. The ontology field, which now plays an important role in natural language understanding and the Semantic Web, developed in response to the phenomena that were identified in the development of knowledge systems. The intense focus on diagnostic design, and planning applications resulted in advances in device understanding, temporal representations, and abductive reasoning.

Although automated reasoning systems in specific domain areas—which was captured by the magazine’s name *IEEE Expert*—was a major focus during my EIC days, we also focused on other areas where theory had ripened enough to start producing applications, specifically natural language understanding and vision systems.

I was lucky that David and his group had done the enormous work that launching a new magazine takes. Nevertheless, we had to work hard to keep pace with the growing interest in the field, not only from researchers in the field, but also from industrial organizations, venture capitalists, and start-ups. Each issue had to contain a mixture so that each constituency could find something of interest. The somewhat academic editorial board couldn’t do it all, but we were fortunate to have IEEE Computer Society’s editorial team who found technical writers to cover some of the commercial and industrial happenings. One type of feature that I had some role in emphasizing was a series of interviews that I did with several leaders who had one foot in the research side and the other foot in the commercialization side. I enjoyed talking to them and presenting their insights to the *IEEE Expert* readership. I was pleased to note that the interviews drew interest from many segments of the readership.

I am writing this from memory; I don’t have access to my files, which is just as well because otherwise this brief memoir might become a long list of names. Yet, like all who hold fancy titles that end in “in-chief,” I only felt a profound sense of gratitude for and dependence on the underlying machinery. In this case, the machinery consisted of the editorial board and the Computer Society’s editorial staff. As EIC, I’d see each issue not much earlier than the subscribers, and I always marveled at the professional sheen the issue had when I held it in my hand—a great multicolored cover, clear graphics accompanying the articles, and so on.

Although I am as capable of lauding the current state of the world as is any person in his sixties, by means of expressions that take the form, “In my day, , but people nowadays ,” I'm pleased to say that I see no such opportunity with respect to this magazine. My successors have led it ably and to great recognition. Some of the expectations for the AI technology were overblown when we started, and so the field naturally underwent some consolidation. My successors had to shepherd the magazine during this consolidation period, and they have done a fine job. Current EIC Fei-Yue Wang tells me that the magazine is now the number one ranked publication in AI among all AI publications this year in terms of impact factors. If I may, and I’m sure quite undeservedly, I’ll bask a little bit in that glory.


I was pleased when current EIC Fei-Yue Wang requested that I prepare a retrospective piece on my time as EIC. Before serving in 1995–1996, I was on the editorial board. The past 15 years have gone quickly, but I recall making a similar statement in June 1996 on the 40th anniversary of AI when it seemed just a blink of an eye since I had attended a 25th anniversary panel discussion of AI’s founders: Minsky, Selfridge, Newell, Simon, and McCarthy. While reviewing my editorial and the issues from my tenure, I was pleasantly reminded of personally and professionally rewarding experiences from my IEEE service. I’d like to share a few of these highlights with you.

First, it was an honor to follow someone I greatly respected, my predecessor, B. “Chandra” Chandrasekaran of Ohio State University, as EIC. It was also a personally rewarding experience for me to work with the great members of the editorial board such as Dan O’Leary, who followed me as EIC, and Dick Price and all the great IEEE Computer Society editorial staff who gently kept me on schedule.

By far, the greatest professional highlight during my tenure was orchestrating the name change from *IEEE Expert* to *IEEE Intelligent Systems*. This experience involved serious and successful discussion with the entirety of the IEEE Computer Society and related committees, which had approval authority for the name and editorial policy. I signaled the change in my first editorial, “My Vision for *IEEE Expert*,” in February 1995, and the rationale was described more fully in my October 1996 editorial:

This change does not mean that we will diminish our coverage of expert systems. Rather, the new name will more correctly reflect the systems and integrated technology coverage that we seek to provide. In so doing, we also hope the new name will enable us to reach out to a broader range of AI researchers, application developers, and end users.

In subsequent editorials over the two-year period, I was able to share my experiences in developing large intelligent systems. In “Reflections on...
Getting Lost: Technology Transfer’s Bermuda Triangle” in April 1996, I related how user-centered knowledge acquisition was a key attribute in developing software requirements for large systems. However, I did not know at the time just how my experience in AI and developing intelligent systems would shape my career path over these next 15 years.

It has been my good fortune to progress through a series of senior university administrative positions and to also serve on federal advisory panels. A solid background in intelligent systems and IEEE experiences has served me well. I will say that the general field of AI and the discipline of building intelligent systems have provided useful insights for the development of large software intensive systems, although it remains somewhat disappointing that the proven technology and practices we developed and demonstrated for the development of intelligent systems (such as intensive user interaction, prototyping, rule-based approaches for workflow representation, intelligent user interfaces, and even approaches for explicit encoding of architecture) are underutilized in the development of large software systems today.

Having had a small role in shaping the direction of this fine magazine and witnessing how successful it has become is a source of great personal satisfaction. I compliment EIC Wang for an exceptional magazine. If you are ever invited to serve on this magazine’s editorial board, or as EIC, jump at the chance. You will benefit greatly from the experience.


During my time as EIC, I met some amazing people and encountered many intriguing intellectual ideas. One of the more tangible events during my editorship was the journal’s name change from *IEEE Expert* to *IEEE Intelligent Systems and Their Applications* (see the sidebar “The Impact of Journal Name Changes on ISI Citations”). At that time, it was clear that the phrase “expert system” had outlived its usefulness as a title and focus for research and for this magazine. Intelligent systems research and applications had moved beyond simply expert systems. It was important to get that evolutionary change onto the cover.

Immediately prior to being editor, I was *IEEE Expert’s* associate editor when Steve Cross was editor. That time was spent being an “apprentice” editor, and it set the foundation for the approach I took while being editor. I continued some traditions that Steve used, such as using special issues to examine particular topics of interest and having an editorial dinner at the Association for the Advancement of Artificial Intelligence (AAAI; formerly the American Association for Artificial Intelligence) conference each year.

At the time that I took over the magazine, Dick Price and Dennis Taylor were the key staff contacts. They were great at making sure that *IEEE Intelligent Systems* worked! I never had to worry about any of the operational details; the details were always taken care of.

There also were *IEEE Intelligent Systems* committee meetings that ended up providing the opportunity to meet and talk with editors from other IEEE publications and the IEEE staff that supported them. Those meetings ended up including topics across computer science, ranging from history to software engineering to Internet computing.

However, perhaps the most memorable aspect of being editor was the yearly editorial board meetings at AAAI, where we would brainstorm potential ideas for special issues for the upcoming year. All the editorial board members were amazingly creative and visionary. At those meetings, virtual potential futures of intelligent systems were laid out in sequences of engaging arguments and tug-a-wars about how the future of research in intelligent systems might proceed.

Later on, I chaired a committee that chose Jim Hendler as the new editor in 2007. Being a part of the choice of a visionary leader for the future was the best way to make sure that the exciting opportunities for *IEEE Intelligent Systems* continued.

**Nigel Shadbolt (2001–2004)**

In the four years of my editorship, I had the privilege of writing a letter in each issue. I recall that I was keen to establish a voice for the magazine and it seemed to me that a regular contribution from the EIC was a good way to do this. So it is a pleasure to be doing so again—now as then the deadline is close and I just hope the words will flow!

One of my main preoccupations as EIC was to balance themed issues with the departments and news, viewpoints, and general submissions that gave *IS* a special blend of depth and breadth. Then as now, we needed quality—*quality* meant impact, and *impact* meant that the title would survive and thrive. A huge amount of energy went in to ensuring that we got great copy and really strong articles.
The Impact of Journal Name Changes on ISI Citations

Daniel E. O’Leary

There have been three different official names for this magazine: IEEE Expert, IEEE Intelligent Systems and Applications, and IEEE Intelligent Systems. Unfortunately, one of the consequences of those name changes has been that the Institute for Scientific Information (ISI) citations for the magazine have been placed under multiple names. As a result, an assessment of the total number of citations, based on any one name, would underestimate the number of indexed items, the total number of citations, and the H index. Furthermore, any measures employed by ISI, such as impact factor, citation half-life, or five-year impact factor, have also been affected, particularly during the transition years.

Table 1 summarizes the affect of name changes on ISI citations as of 5 September 2010. Name changes influence the number of citations attributed to different abbreviations, generally for a year or two. For example, when the name changed from IEEE Expert, there were 52 and 42 indexed papers in 1996 and 1997 attributed to that name, respectively. However, there were 21 and 25 indexed papers attributed to IEEE Intelligent Systems and their Applications.

Table 1. ISI Citations for the three different names of IEEE Intelligent Systems.

<table>
<thead>
<tr>
<th>Actual name</th>
<th>ISI abbreviation</th>
<th>Years</th>
<th>Entries</th>
<th>Citations</th>
<th>H index*</th>
</tr>
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<tbody>
<tr>
<td>Various names</td>
<td>IEEE Intelligent Sys</td>
<td>1988–2010</td>
<td>529</td>
<td>1,162</td>
<td>11</td>
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<tr>
<td>IEEE Intelligent Systems and Their Applications</td>
<td>IEEE Intell Syst App</td>
<td>1996–2001</td>
<td>946</td>
<td>8,036</td>
<td>42</td>
</tr>
<tr>
<td>IEEE Intelligent Systems</td>
<td>IEEE Intell Syst</td>
<td>2001 to present</td>
<td>636</td>
<td>5,115</td>
<td>32</td>
</tr>
<tr>
<td>Together</td>
<td></td>
<td>1986 to present</td>
<td>3,959</td>
<td>21,332</td>
<td>51</td>
</tr>
</tbody>
</table>

* The H index is computed as follows: Let \( n \) be the number of papers published by a given entity (researcher, journal, department, university, or the like). An entity has an index \( H \) if \( H \) of its \( n \) papers has at least \( H \) citations each and the other \( (n - H) \) papers have \( \geq H \) citations each.

Much of that was down to a fantastic publishing and editorial team; it wouldn’t have been half as much fun without the help of Angela Burgess, Dick Price, Dennis Taylor, Crystal Shif, and the rest of the team. The other key to quality was an Editorial Board who were superb—their only reward the thanks of the EIC and a good meal once a year!

It was a time when we recognized the importance of our subject within other disciplines. We had special issues on biology, commerce, games, and robotics, though just like today, ideas from AI and Intelligent Systems were pervasive. Then as now, ideas were launched that morphed into something different yet familiar. The Grid may have become the cloud but intelligent systems work is still supporting collaborative science and engineering. The Semantic Web is still an important area of research. But in the years that have followed, we have seen the emergence of linked data, a kind of pragmatic Semantic Web.

Of course, larger events can shape an era too. Early in my EIC tenure we had 9/11, and I wrote at the time that this would change the world we lived in and the work we did. So it has proved—around the world IS research has been directed to the challenges of national security. Some things continue as they have from the founding of this magazine, particularly the increase in computing power that becomes ever smaller and cheaper. The creation of an intelligent pervasive computing fabric continues now as it did then.

Promoting an interdisciplinary approach to IS was always important to me because our subject is one that draws on many others, from linguistics to logic, engineering to economics. Indeed, one of my major preoccupations over the past few years has been the promotion of Web science. To understand the Web and anticipate how it might develop and evolve, we need insights from a range of disciplines. One such insight for me is the role of a new kind of AI, an augmented intelligence where humans and machines collaborate on the Web to achieve things that neither could achieve alone. Now that is an exciting future, one that I’m sure we will see featured in IS in the years to come.


I am tempted to say that my greatest contribution to this magazine was getting rid of the photo of the EIC on the editorial and replacing it with a caricature. Although that may not seem like much, it actually was something I fought for very hard because one of the hallmarks of my editorship was trying to adapt the magazine to a changing world. As the IEEE and other professional societies grappled with the important issues of the changing business models of professional publishing, I still felt there was something important about the physical nature of a high-impact magazine of this type. All the editors of this publication have struggled to make
it not just a “write only” repository of high-quality reviewed papers, but to make sure that every issue included a range of other content that would inform our readers about what was happening in the field. The entire package of articles, rather than one article found in a Google search, is what I wanted to emphasize, and the caricature became a symbol of that goal.

Perhaps more importantly, I was also lucky enough to be the EIC at the time of the 50th anniversary of the Dartmouth Workshop that many people consider a key founding event in the life of our young field. As the 2006 date of the event approached, I realized that various organizations such as the AAAI and Dartmouth itself were hosting workshops focusing on the field’s history. It seemed to me, however, that a more appropriate celebration would be to do what the founders of the field had done at that and other early meetings—try to create a vision of the future. So I am extremely proud that we ended up with a special issue focusing on the future of AI, with contributions from a number of intelligent systems luminaries including Raj Reddy, Dave Waltz, Yorick Wilks, Luc Steels, Tim Berners-Lee, and a number of others. I’m even prouder of the fact, bittersweet though it is, that Karen Sparck Jones and Oliver Selfridge, both no longer with us, had articles in that issue.

However, the most important contribution of that issue, and one which I hope will continue as long as Intelligent Systems does, was the launching of the “10 to Watch” column—a biennial column in which we solicit nominations for, and choose, 10 of the best young researchers in the field. The young scientists who best represent the many approaches to exploring the role of intelligence in implemented systems are the true future of our field. To date, we have tapped 20 truly exceptional researchers in the first two sets of “10 to Watch,” and another 10 will be named soon.

In fact, looking back, while the caricature was symbolic of my approach to the magazine, the recognition of the future of our field, and of the best young researchers taking us there, was the clear highlight of my time as EIC.

Selected CS articles and columns are also available for free at http://ComputingNow.computer.org.

How to Catch a Robot Rat
WHEN BIOLOGY INSPIRES INNOVATION
Agnès Guillot
and Jean-Arcady Meyer
translated by Susan Emanuel

“Over the last twenty-five years, a subset of computational and robotics researchers around the world have taken to studying biological creatures in order to figure out how to build robots. And at the same time, the constraints they have discovered in building robots have been used to illuminate how the biological systems must work. Guillot and Meyer have been both intellectual and organizational leaders in this field, and in How to Catch a Robot Rat they carefully document the history and intellectual currents of the field.”
— Rodney Brooks, MIT

Information Retrieval
IMPLEMENTING AND EVALUATING SEARCH ENGINES
Stefan Büttcher, Charles L. A. Clarke, and Gordon V. Cormack

“An academic dynasty has come together to write an excellent textbook on information retrieval. Stefan Büttcher, Charles Clarke, and Gordon Cormack make up three generations of stellar information retrieval researchers with over fifty years of combined experience… This book is a must-read for all search academics and practitioners!”
— from the foreword by Amit Singhal

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