**Mary Shaw**

Mary Shaw is an American software engineer, born in 1943, who has had a significant impact on the way that software is used today. She is widely regarded as being one of the pioneers in the field of software architecture, which came about in the 1990s. Software architecture refers to a representation of a program or computing system which is used to aid understanding and reasoning about why the system behaves in the way that it does, and how it may behave in the future. Shaw has also worked on research projects involving end user software engineering, algorithm analysis and development of programming languages. She has also been heavily involved in education and the teaching of computer science.

Shaw was born in Washington D.C. and attended high school in Bethesda, Maryland. It was during her school years that she became interested in computers. She received her bachelor’s degree from Rice University in Texas, and her Ph.D. in computer science from Carnegie Mellon University, Pennsylvania in 1972. Shaw has been a faculty member at the university ever since.

One of Shaw’s first notable works was the development of the Shaw-Traub algorithm in 1974, in collaboration with Joseph Traub. This algorithm was a method for evaluating a polynomial which was much faster for computers, as it required “the same number of additions but… (was) linear in multiplications and divisions”. This algorithm is still used today, and it allowed Shaw to develop her interest in making computers more efficient, which can be seen in her later work.

This work led Shaw to the study of abstract data types. The use of an abstract data type separates two different areas of a program – specification and implementation. Specification refers to what the program actually involves and what operations can be performed on it, while implementation deals with how the program and the operations can actually be used. This brought her, along with William A. Wulf and Ralph L. London, to the design of a new programming language called Alphard. It was never implemented but was extremely innovative, as it was the first programming language to make use of datatypes. In the context of the languages that are available today, it is most comparable to Pascal.

Following on with her interest in abstract data types, Shaw went on to work to simplify the use of abstractions in programming. Abstract is defined as making the “elements of the program… further removed from the details of how the computer works and closer to the language of the problem that a user is trying to solve.” At the time, many programmers were working to try and move away from using binary machine language to code problems and towards writing in a specific programming language that could more accurately reflect the nature of the program being solved. Shaw’s work on abstractions helped this work immensely, and was used to create the types of programming languages that we are familiar with today.

Shaw’s most famous and most cited work is “Software Architecture: Perspectives on an Emerging Discipline” – written in collaboration with David Garlan in 1996. This book explores the new idea of software architecture and how vital it is the development of good software. It showed that architectural design underpins all contemporary software engineering, and that it is fundamental in understanding how the system behaves. Without a solid basis in good architecture, a system is unreliable and untrustworthy.

The significance of this work is still clear today. William Scherlis, director of Carnegie Mellon University, said in 2011 of the work done by Shaw and Garlan – “(It) has since led to engineering methods for architectural modelling, analysis and identification of architecture-level patterns, the use of which has now become standard in the engineering of larger scale software systems.”

Shaw has received numerous awards for her contributions to software engineering over the years, including but not limited to –

* The Warnier Prize for contributions to software engineering – 1993
* The Stevens Award for outstanding contribution to literature or practice of methods for software and systems development – 2005
* The Outstanding Research Award from ACM SIGSOFT (the Association of Computing Machinery’s Special Interest Group on Software Engineering) – 2011
* The National Medal of Technology and Innovation presented by President Barack Obama – 2014
* TCSE (Technical Council on Software Engineering) Distinguished Women in Science and Engineering Leadership Award – 2017

The impact of Shaw’s work is clearly seen through her innovative ideas, centred around promoting an understanding of how software engineering should be developing over time, and spreading the knowledge of the discipline. Shaw has spent much of her career teaching computer science, both at undergraduate and postgraduate level. She has also assisted in the development of a new curriculum for the teaching of computer science at Ph.D. level which is widely used today. Shaw has authored, co-authored and edited seven books and more than 200 research papers and technical reports over the years about her work. Her career has spanned over 40 years and within this time she has made significant advances in the field of software engineering, while also teaching and inspiring the next generation of computer programmers. She was one of the first females to receive a Ph.D. in computer science, which only proves her revolutionary attitude and inspirational status.

Websites used:

1. “Mary Shaw Biography”, accessed at: <http://biography.yourdictionary.com/mary-shaw> , 05/11/17.

2. “Institute for Software Research – Mary Shaw”, accessed at: <http://www.isri.cmu.edu/people/core-faculty/shaw-mary.html> , 05/11/17.

3. “Mary Shaw Biography”, accessed at: <http://ethw.org/Mary_Shaw> , 05/11/17

4. “CMU professor Mary Shaw receives highest honor in the nation for technological progress”, accessed at: <https://www.nextpittsburgh.com/business-tech-news/cmu-professor-mary-shaw-receives-highest-honor-nation-technological-progress/> , 05/11/17

5. “Analysis of a family of algorithms for the evaluation of a polynomial and some of its derivatives”, Mary Shaw and Joseph Traub, accessed at: <http://repository.cmu.edu/cgi/viewcontent.cgi?article=2601&context=compsci>, 05/11/17

6. “An Introduction to Software Architecture”, David Garlan and Mary Shaw, accessed at: <https://www.cs.cmu.edu/afs/cs/project/able/ftp/intro_softarch/intro_softarch.pdf> , 05/11/17.