Biography - Mary Shaw

Personal life

Mary Shaw is a computer Scientist from Washington D.C. She attended high school during the cold war era and showed an interest in computers from an early age, participating in after school programs run by IBM teaching other students about the new rapidly advancing technologies in the field.

She studied in Rice University, graduating in 1965. After completing her BA she worked as a systems programmer in the Research Analysis Corporation, and later studied for a PhD in Carnegie Mellon University and was awarded it in 1972. Following this, she joined the Carnegie Mellon faculty and was appointed Professor of Computer Science.

Work in Software Architecture

In the 1990's Shaw co-authored, with fellow Carnegie Mellon graduate David Garlan, a number of papers which were critical to the emergence of the field of Software Architecture. In the 1994 talk, *An Introduction to Software Architecture*, they proposed a solution to increasing complexity and size of software systems:

> *"As the size of software systems increases, the algorithms and data structures of the computation no longer constitute the major design problems. When systems are constructed from many components, the organization of the overall system—the software architecture—presents a new set of design problems. This level of design has been addressed in a number of ways including informal diagrams and descriptive terms, module interconnection languages, templates and frameworks for systems that serve the needs of specific domains, and formal models of component integration mechanisms."*

They suggested a standardised style of design for organising these complex systems using architectural concepts, which had been in use in other fields of engineering, such as civil and mechanical, for at least a century. The aim was to illustrate how

architectural representations could improve the understanding of complex software systems. This talk laid the foundations for their next work.

Software Architecture: Perspectives on an Emerging Discipline

In 1996, Shaw and Garland published the book *Software Architecture: Perspectives on an Emerging Discipline*. This built upon the groundwork laid in their talk from two years prior.

The book promoted concepts such as components, connectors, and styles, in order to facilitate a modular design for software systems, where components can be moved or exchanged without disrupting the execution of programs. The intention of using architectural design in software systems was *"to be able to recognize common paradigms so that high-level relationships among systems [could] be understood and so that new systems [could] be built as variations on old systems."*

Impact & Legacy

Today software architecture is used to make fundamental structural choices which would be costly to change once implemented. For example, systems that control space shuttle launch vehicles need to be very fast and very reliable to avoid disastrous consequences such as millions of dollars of damage and the possible injury and death of the crew on board. Software architecture also allows the reuse of design components between various projects, again saving costs in terms of both money and time, which is essential when dealing with large scale applications. The abstractions provided by software architecture also facilitate the education of future generations of engineers, as the diagrams are designed specifically with readability in mind.

In 2011, both Shaw and Garlan were awarded the Outstanding Research Award by Carnegie Mellon as recognition for their work. Later in 2014, Shaw was awarded the National Medal of Technology and Innovation by Barack Obama. She continues to gives talks about the history of the principles of architecture in relation to software design and is still the Professor of Computer Science at Carnegie Mellon.

Bibliography:

1. https://en.wikipedia.org/wiki/Mary_Shaw_%28computer_scientist%29
2. *An Introduction to Software Architecture*, Shaw & Garlan (1993)
3. *Software Architecture: Perspectives on an Emerging Discipline*, Shaw & Garlan (1996)