Assignment Description; To produce a short (2-4 page) biography of a key software engineer, discussing the work and impact of the individual.

I chose to complete a biography of Mary Shaw, a software engineer who has had a huge impact on Software Engineering. Although she was initially discouraged from entering the field due to her gender[i], she is now a major forerunner in the field of Software Architecture.

In researching for this assignment, I made use of the Google search bar. Rather unfortunately there exists a more famous Mary Shaw, an undead ventriloquist in a movie called "Dead Silence". Upon my initial Google search of Mary Shaw, a rather shocking picture of said character appeared on my laptop screen at 12am. See below;

In order to complete this assignment, I made sure from then on to clarify my search as "Mary Shaw Software Engineer".

Academic Background

Mary Shaw was born in Washington D.C. in 1943. At high school, she was first introduced to computers when she attended an after-school program run by IBM. She completed her bachelor's degree at Rice University, a private research company. She continued to conduct research there after her studies, as well as working in system programming at Research Analysis Corporation. She later completed her PHD in computer science at Carnegie-Mellon.[ii]

Software Architecture

Mary Shaw is a pioneer in the promotion of software architecture as a discipline. Shaw has co-authored multiple works on the subject alongside David Garlan. Software architecture is a term used to describe how the internal design of software systems are structured[iii]. In software design, software architecture techniques have always been implemented unintentionally. In their work together, Shaw and Garlan give definition to these techniques and explain the different software architecture strategies commonly implemented[iv].

To analyse different software architecture methods, Shaw and Garlan describe a system as consisting of components linked together by connectors. Their interactions are limited by constraints.[v]

One architecture style they explain is the Data Abstraction and Object-Oriented Organisation style. Here abstract data types are called managers. The components are instances of abstract data types. Invoking functions and procedures are the connectors that let objects interact with each other.

Another style they define is a layered system. This system involves the components of multiple 'layers' which interact with their adjacent layers via connectors.

Software architecture can involve any one style, or even a hybrid of multiple styles. Choosing the most appropriate style depends on the problem – what type of data are you dealing with, what data flow will you be, will your system need to continuously evolve etc.[vi]

Mary Shaw has published other work on the history of Software Architecture and the tools that support it. Her work on software architecture hugely impacts how software architecture methods are implemented. Alongside Garlan, they were the first to address software architecture in a systematic way.[vii]

Adaptive Systems

Mary Shaw's other work includes publications on adaptive systems. In her work "Visibility of Control in Adaptive Systems" she explains the importance of addressing adaptability of a system during a system's design phase[viii]. A feedback loop is where the output of a system triggers a system change[ix]. This means self-adaptive systems increase in productivity. The paper argues that feedback loops should be extremely visible, contrary to the widespread belief that they should be hidden within systems to reduce perceived complexity.[x] Shaw has presented multiple architecture styles which include feedback controls for adaptive systems.

Her work on adaptive systems included analysis on the process software engineering in developing self-adaptive systems and the challenges in designing them.

Other Areas of Interest

Her other research looks at **everyday software** such as software for mobile phones. Software development methods should change when catering for everyday software as opposed to catering for complex systems. In designing everyday software, user readability and dependability is key. She has also looked at optimizing **quality human interfaces** and allowing people who aren't computer experts to interact with systems. She has an interest in enabling non computer experts to tailor software to suit their own needs.[xi]

Awards and Other Achievements

In 1993, Shaw was presented the Warnier prize from Carnegie-Mellon for her work in software engineering.

In 2005, Shaw received the Stevens Award, a lecture award presented by the Reengineering Forum.

She received an Outstanding Research Award in 2011 with David Garlan for a publication on Software Architecture.

Shaw received The National Medal of Technology and Innovation, presented to her by Barack Obama in 2012. This is the highest honour you can receive in the US in the field of technology.

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She was also one of the founding members of the Software Engineering Institute (SEI), a research and development centre.

Conclusion

Mary Shaw is now a professor at Carnegie Mellon University[xiii]. So far, her career has amassed highly successful reports, articles and conferences. She can be credited with a significant rise in popularity of the discipline of Software Architecture. Mary Shaw has completed extensive research in Software Engineering. I found her particularly inspiring as she also strongly advocates the publishing of her work for the purpose of education. While she has impressive experience and achievements, she is strongly interested in the education side of Software Engineering. Shaw has "had the great good fortune to spend (her) professional career in a department …in which the quality of technical contributions matters vastly more than gender[xiv]." I believe her work has had a long-lasting impact on software engineering and I find her to be inspiring as a significant female software engineer.

Sources

[i] https://nationalmedals.org/laureate/mary-shaw/

[ii] https://en.wikipedia.org/wiki/Mary_Shaw_(computer_scientist)

[iii] https://martinfowler.com/architecture/

[iv] https://books.google.ie/books/about/Software_Architecture.html?id=5KlQAAAAMAAJ&redir_esc=y

[v] https://www.semanticscholar.org/paper/An-Introduction-to-Software-Architecture-Garlan-Shaw/35f829756e26101731dc7c800020a574e9abe76a

[vi] https://www.semanticscholar.org/paper/An-Introduction-to-Software-Architecture-Garlan-Shaw/35f829756e26101731dc7c800020a574e9abe76a

[vii] https://en.wikipedia.org/wiki/Mary_Shaw_(computer_scientist)

[viii] http://www.cs.cmu.edu/~Compose/ulssis07-muller.pdf

[ix] https://medium.com/@lucamezzalira/the-power-of-feedback-loops-f8e27e8ac25f

[x] https://resources.sei.cmu.edu/asset_files/TechnicalReport/1994_005_001_16316.pdf

[xi] https://hcii.cmu.edu/people/mary-shaw

[xii] https://www.cmu.edu/news/stories/archives/2014/november/november19_shawreceivesmedal.html

[xiii] https://www.linkedin.com/in/mary-shaw-107263a4/

[xiv] https://nationalmedals.org/laureate/mary-shaw/