



Sources	PwC		
Date	November 2020		
Potential scale of impact	Certainty of outcome	Impact horizon	
★★★★★	★★★★★	H1	H2 H3

There are certain, complex programming problems – facial recognition, natural language processing, autonomous vehicles, precision medicine – that are nearly impossible to address using traditional rule-based programming. In these cases, it is easier to create AI, Deep Learning and Machine Learning models that can be trained (with large data sets) to learn and adapt in order to deliver the right actions – rather than *being coded* to deliver the right actions. This is the philosophy of Software 2.0.

Software 2.0 differs from existing software development in five key dimensions:

- **Output:** The output from traditional software is certain, while model output is typically uncertain
- **Decision space:** The decision space for traditional software is static, while for models it is dynamic. The data used to train the model might be constantly changing requiring frequent retraining of the model
- **Inference:** The inference process for traditional software is deduction implemented through code; while for models the inference is inductive based on generalization of data
- **Development process:** The development process for traditional software is linear and iterative; while for models the process is based on experimentation.
- **Mindset:** Software developers typically have an engineering mindset; while model developers or data scientists typically have a scientific mindset.

The increasing scale and sophistication across the combination of software, models and data has seen the emergence of new roles. Software development has had roles that reflect the scoping, design, development, operations, and maintenance phases of the software life cycle (business analyst, systems analyst, architect, developer, tester, DevOps and so on). The emergence of Machine Learning models and Software 2.0 requires a number of new skills and roles, including Data Scientists, Data Engineers, ML Engineers, and MLOps. These roles also reflect the coming together of multiple disciplines – software engineering, software operations, statistics and machine learning and data management.

