Selected model: Waterfall

Advantages and disadvantages between Agile and Waterfall

In the Waterfall model, extensive planning, documentation, and a linear pathway are prioritized. Described in the book *Agile Practice Guide*, the waterfall life cycle (referred to in the book as the predictive life cycle) mitigates risk and cost through an emphasis on serialized work and using proven techniques [1]. Because the bulk of the planning occurs at the start, the team also minimizes uncertainty. However, because of the linear nature, if changes to requirements or specifications *do* occur, then the project will incur costs that were not accounted for during the initial planning phase. Another disadvantage of this approach is that the delivery of value is delayed until the end of the project.

By contrast, the Agile model emphasizes a dynamic nature. The *Manifesto for Agile Software Development* states the following core principles of the model:

"Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
the right, we value the items on the left more." [2]

While planning and documentation do exist in this model, they are not as extensive in the beginning as they are in the Waterfall model, and they exist in every stage of the life cycle as changes come and go. In the book *Handbook of Software Engineering Methods*, Letaw describes Agile as having frequent and incremental releases [3]. This iterative approach to development also uncovers hidden costs and changes that would not have been planned for in the Waterfall model. One disadvantage of Agile is that its lower emphasis on planning makes it unsuitable for projects that call for extensive planning and documentation, such as physical projects like construction and civil engineering.

Examples of Each Model

Waterfall
A construction company has been hired to build a new hospital. They have been given specifications for how many rooms and floors the hospital needs. The hospital must adhere to certain standards for accessibility and space, as well as city zoning laws. This project calls for a Waterfall development model because the things a hospital requires and the standards it must uphold to serve its purpose are well known and extensively documented at this point in history.

Agile
A state transportation department is seeking to develop a new application for commuters taking the local transit system. The department wants features not typical for a transit app, like train driver rating, a message system, and a rewards system for frequent riders. The development of this app will need frequent testing with users. This project would call for an Agile approach because there is not a lot of existing documentation on the subject matter, and the need for iterative testing would work well with frequent deliveries.

Sources:
[1] Agile Practice Guide, Project Management Institute, 2017. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/osu/detail.action?docID=5180850.

[2] Manifesto for Agile Software Development, 2001. Beck et al. https://agilemanifesto.org

[3] Handbook of Software Engineering Methods, 2024. Lara Letaw. Oregon State University, https://open.oregonstate.education/setextbook/