PROJECT MANAGEMENT
CENTER FOR EXCELLENCE
A.J. CLARK SCHOOL OF ENGINEERING
Civil & Environmental Engineering Department

ACCREDITED PROGRAM

# BEYOND AGILE: CONSTRUCTION COST MINIMIZATION THROUGH OPTIMAL AND INFORMED RISK MANAGEMENT, CONTRACTUAL AGREEMENTS AND NEGOTIATIONS

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PMSYMPOSIUM.UMD.EDU

# Overview

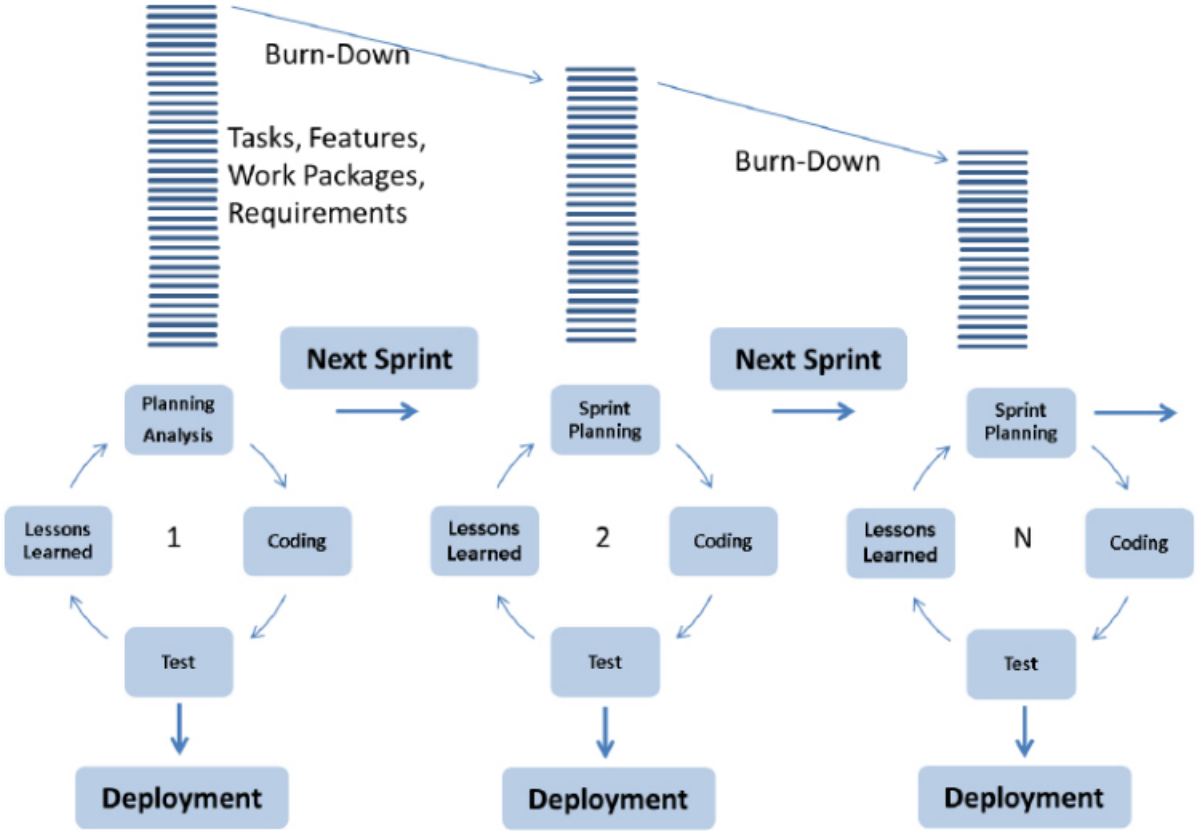
- Agile
- Fragile

Agile

# WHAT IS THE APPROACH?

# AGILE Manifesto

- Sprints
- Highest priority first
- 12 principles
  - Suits well the IT Industry
  - Can be challenging for other industries




https://www.pmi.org/learning/library/agile-software-applied-to-construction-9931

# 12 Principals

1. "Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

# 12 Principals

7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity—the art of maximizing the amount of work not done—is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly" (Beck et al., 2001).

Equilibrium

# WHAT IS IT?
# WHAT IS SO DIFFERENT AND SPECIAL IN IT?

# Equilibrium

- Everything in real life tends to get into equilibrium
  - Otherwise, things keep moving around
  - Same is true for project management
- All parties should agree on terms to proceed with success

# Equilibrium

- How to get it?
  - Game-Theoretic Approach
    - Think of a project where multiple contractors are involved with their prices for three different level of price for their services per unit output.
    - They compete to get the projects and any change order

# Equilibrium

- How to get it?
  - Game-Theoretic Approach
    - As an example think of a project where multiple contractors are involved with their prices for three different prices for their services per unit output depending on the level.
    - They compete to get the projects and any change orders

# Equilibrium

- Option A can be delivered for $20.00,
- Option B for $40.00
- Option C for $50.00 per unit.
  - For the low price trade there is 40,000.00 units of demand for each month by the owner directly and if both contractors bid with the same low price the amount of work is split between them.
- Expected that stakeholders will want additional 60,000 units.

# Equilibrium

- Lets assume there are two contractors and the table below is their payoff matrix. If bid the same price units split.

| | A - $20 | B - $40 | C - $50 |
|---|---|---|---|
| A - $20 | $1000, $1000 | $1400, $1200 | $1400, $1500 |
| B - $40 | $1200, $1400 | $2000, $2000 | $2800, $1500 |
| C - $50 | $15,00 $1400 | $1500, $2800 | $2500, $2500 |

# Equilibrium

- Both would preferably stay on $40 option to make $2,000,000.00 each.

- Table 2. Reduced Payoff Matrix (x1000)

| | B - $40 | C - $50 |
|---|---|---|
| B - $40 | $2000, $2000 | $2800, $1500 |
| C - $50 | $1500, $2800 | $2500, $2500 |

# Highest Priority First May Not Be The Best Option

- Scenario with two products with profit of $300 profit per unit of product one and $200 profit per unit from product two. Each product uses two types of resources and there are resource limitations.

# Highest Priority First May Not Be The Best Option

- Product one uses 2 units of resource one
- Product two uses 1 unit of resource one
- Product one uses 1 unit of resource two
- Product two uses 1 unit of resource two
- Resource one is available up to 100 units
- Resource two is available up to 80 units
- Max 40 units of Product one is in demand

# Highest Priority First May Not Be The Best Option

- If go with highest priority then depending on the scenario maybe the highest profit product will be the highest priority item to produce
  - This option will lead to max 40 units with $300 returning $12,000
  - Rest of resources could be used to produce 20 units of Product 2 resulting in $4,000
  - Totaling to $16,000

# Highest Priority First May Not Be The Best Option

- This result of $16,000 is obtained if we follow the Agile Manifesto
- If we use Management Science we can find that $18,000 would be the profit that can be made if produce 20 units of Product 1 and 60 Units of Product 2

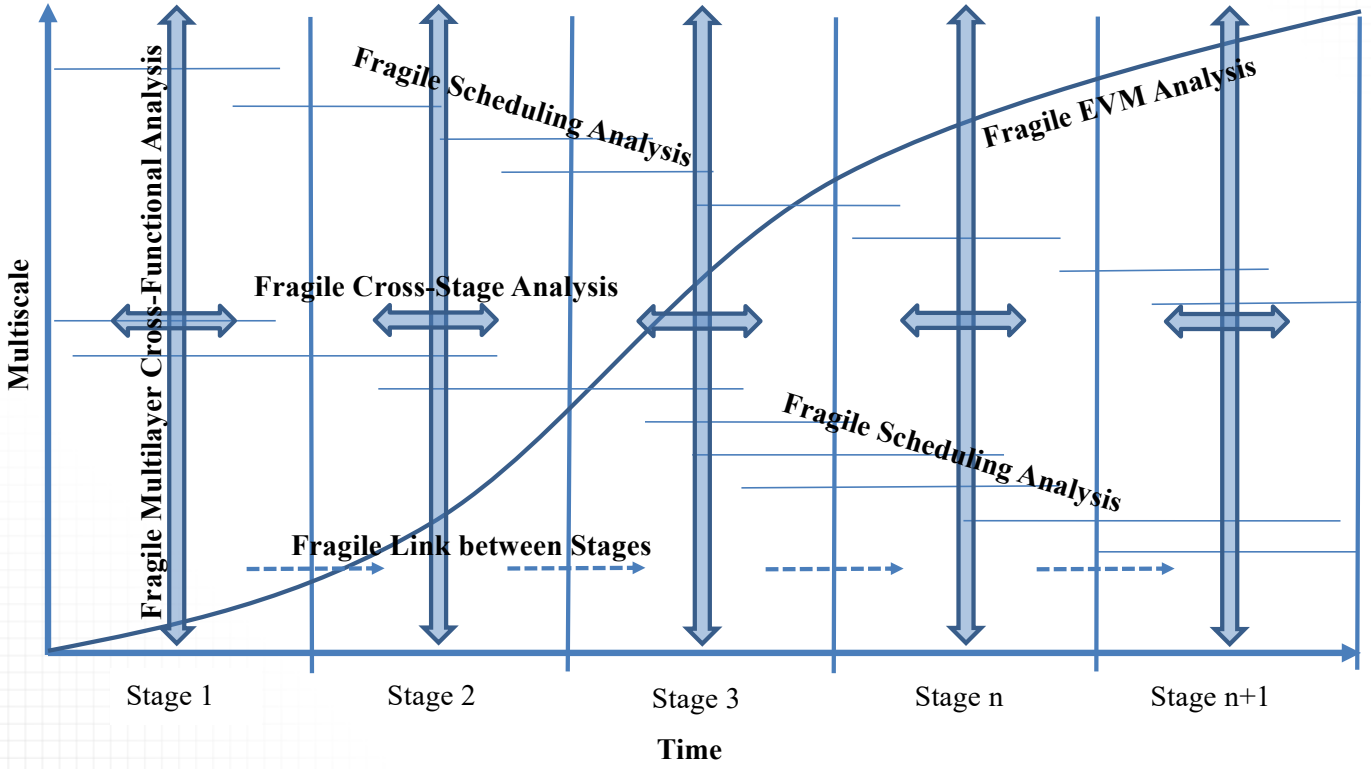
# Fragile Approach

- The above two examples demonstrate that in fact the management with not well informed decision-making makes any process and project ***fragile***
- There are much better outcomes that can be used for cost and risk minimization, contractual agreements and negotiations

# Fragile Approach

- As a result the Fragile Approach is developed with the tools to analyze and manage projects beyond Agile Manifesto

# Fragile Approach



# Conclusions

- As much as Agile is challenging to apply beyond Software and IT industry Fragile is easy to apply in projects and programs in other industries.

- Fragile is an approach suggested to evaluate projects at every stage very carefully, take actions as necessary for optimally managing it instead of just feasibly managing it.

- It assists in avoiding unnecessary risks and even developing better contract terms. The question that can be answered by Fragile Approach is that if there is any better way of doing things while keeping all involved parties to its possible highest level of satisfaction.

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# QUESTIONS?