

**Use Case 2: Initiate Launch****Scope:** Launch Simulator**Level:** Flight Director Goal**Primary Actor:** Flight Director**Related Use Cases:** *Use Case 1: The Users shall monitor Pre-Launch Activities***Stakeholders & Interests:**

- Flight Controller: wants to initiate Launch
- Astronaut: wants successful Launch
- Flight Director: wants a successful Launch
- Administrator: wants a successful Launch
- Local and Federal Politicians: want a successful Launch for campaign, re-election and other political purposes

**Pre-Conditions:** All Pre-Launch Activities are complete: the Countdown is at Zero, there is no hold nor abort on the Countdown, the System indicates no errors in the Pre-Launch Data**Post-Conditions:** The Transition to Launch successful**Main Success Scenario:**

| Flight Director     | System  |
|---------------------|---|
|                     | 1. Indicates Countdown at zero and ready to launch              |
| 2. Initiates Launch |   |
|                     | 3. Directs Engines to ignite                                    |
|                     | 4. Returns confirmation of the engine ignition                  |
|                     | 5. Monitors Launch Data   |
|                     | 6. Returns Launch Data  |
|                     | 7. Repeat 5 & 6 Until Transition out of Launch Initialization   |
|                     | 8. Rocket ready to Launch                                       |
| 9. Launch Rocket    |   |
|                     | 10. Execute the Launching Mechanism (Launches Rocket)           |
|                     | 11. Monitors Rocket for Clearing the Launch Tower               |
|                     | 12. Returns Rocket's current height                             |
|                     | 13. Repeats 11 & 12 until Rocket Clears Launch Tower            |
|                     | 14. Returns Rocket Cleared Tower                                |
|                     | 15. Transitions to Launch upon Rocket Clearing the Launch Tower |
|                     | 16. Informs of Transition                                       |

### **Alternative Flows:**

- \* If the System is Fully Automated, then the System initiates the Launch, asses if/when to launch the Rocket and commands the mechanisms responsible for launching the Rocket. The Flight Controller has the ability to perform an manual override as needed
- 1a. Based on the data provided, the System advises the Flight Director on Launch Viability
- 2a. The Flight Controller can chose when to Initiate the Launch (it does not have to be immediately after the Countdown at zero)
- 2b. The Flight Controller can chose not to Initiate the Launch
- 4a If the Engines do not ignite, then the System Alerts the Flight Controller of the issue, the Flight Controller aborts the launch and all the actors follow their repsective Launch Abort Procedures
- 5a-8a If the System communicates an error/issue in the Launch Data, then the System alerts the Flight Controller of the error/issue, with recomendation (abort/not abort Launch).
- 9a. At anytime, the Flight Controller can abort the Launch, the System will not activate the Launch Mechinism, all the actors are to follow their respective Launch Abort Procedures.
- 16a. In the event of a Launch Abort, the System will not transition to Launch

### **Special Requirements:**

- The Launch Initialization is from when the Flight Director Initiates the Launch Sequence to when the Rocket Clears the Launch Tower. The Flight Director has the ability to Abort the Lauch Initialization. Special Abort Procedures must be developed and followed by the Flight Controller, and the Astronauts.
- Several factors and data points are required to determine if/when the Rocket is ready to Launch. The System will monitor all of these factors. All of these factors must be in a stable and exprected state before the System will advise on launching the Rocket.
- There is only one point of Decision for the Abort. That decision rests with the Flight Controller. Currently, the Flight Controller takes no advisement other than System Data.

### **Technology & Variations List**

- \* The Launch Initialization data can be viewed simultaneously, or chose to view selected Pre-Launch data, at the discretion of the Flight Director.

- \* If the System is automated, then the System would determine when to ignite the engines, when to execute the Launching Mechanism, and make the decision to abort the Launch Sequence. The Flight Director would have final authority.

**Frequency of Occurrence:** Almost continuously. Based on the Frequency of desired Launches.

**Open Issues:**

- Need to create a list of the Launch Data to monitor: needed for the decision for when to launch the Rocket
- What are the abort procedures?
- Consider shutting down the Rocket engines as part of the abort procedures
- If the Rocket engines are not capable of shutdown, consider other possible abort procedures
- Should the Astronauts have the ability to abort the Launch initialization?