# AGM - Arcade Game Maker Pedagogical Product Line

# Descrição Geral

A linha de produto (LP) Arcade Game Maker (AGM) produz uma série de jogos arcade. Cada jogo é jogado por um único jogador que controla, parcialmente, os objetos que se movem. O objetivo é marcar pontos acertando obstáculos estáticos. Os jogos vão desde aqueles com obstáculos baixos até obstáculos altos e estão disponíveis para uma variedade de diferentes plataformas.

# Similaridades e Variabilidades

## Similaridades

* cada produto é um jogo com elementos specíficos do jogo;
* pode ser jogado por um único jogador;
* oferece uma visão gráfica do jogo;
* utilizam objetos estáticos ou em movimento;
* todo jogo possui um conjunto de Sprites (seção II.3);
* todo jogo possui um conjunto de Rules (seção II.3);
* todos os jogos envolvem movimentação.

## Variabilidades

* **Tipos de Regras**: é a maior diferença entre os jogos. Algumas regras estão relacionadas às leis da física (gravidade, colisões, etc) e podem ser aplicáveis a múltiplos jogos. Outras regras estão especificamente relacionadas a um jogo e podem ser usadas em todas as implementações do jogo, mas não se aplicam a outros jogos;
* **Tipos de Movimentação**: em alguns jogos a movimentação é inerente à operação do jogo. Isto acontece periodicamente e é orientada pelo tempo. Em outros jogos, o jogador escolhe e inicia a movimentação, sendo ações dirigidas pelo ator.

# Requisitos

## Cenários dos Casos de Uso

### Play Selected Game

|  |  |
| --- | --- |
| **Use Case Name:** | Play Selected Game |
| **Use Case ID:** | AGM001 |
| **Use Case Level:** | Abstract |
| **Actor:** | GamePlayer or GameInstaller |
| **Preconditions:** | AGM011: Install game has completed successfully. |
| **Postconditions:** | Actor has won/lost/tied and the game is ready to play again. |
| **Detailed Description** | |
| **Trigger:** | Actor selects game executable and initiates execution. |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects PLAY from the menu | Initializes the game and displays the gameboard | | Left-clicks to begin play | Starts game action | | Left-clicks or uses keyboard to enter commands | Responds to the command in the expected manner | | Responds to Won/Lost/Tied dialog box with left-click | Returns the gameboard to its initialized, ready-to-play state | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | At any time, may select EXIT from the menu | See AGM002: Exit game | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | See AGM006: Play Brickles |  | | See AGM007: Play Pong |  | | See AGM008: Play Bowling |  | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | AGM002: Exit game |
| **Decision Support** | |
| **Frequency:** | On Demand |
| **Criticality:** | High |
| **Risk:** | Low |

### Exit Game

|  |  |
| --- | --- |
| **Use Case Name:** | Exit Game |
| **Use Case ID:** | AGM002 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GamePlayer or GameInstaller |
| **Preconditions:** | Game system is running. |
| **Postconditions:** | Game system is terminated. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects EXIT from system menu | Prompts actor to save or exit the game | | Saves game | Saves the game and exits the program | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Cancels the EXIT action | Returns to suspended action | | |
| **No. 2:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | May initiate EXIT by left-clicking the upper right-hand corner of the game window | Prompts actor to save or exit the game | | Saves game | Saves the game and exits the program | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | AGM001: Play selected game |
| **Decision Support** | |
| **Frequency:** | Low - only once per game start-up |
| **Criticality:** | Low |
| **Risk:** | Low |

### Save Game

|  |  |
| --- | --- |
| **Use Case Name:** | Save Game |
| **Use Case ID:** | AGM003 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GamePlayer or GameInstaller |
| **Preconditions:** | Game executable is running, and a game has been started. |
| **Postconditions:** | Current state of the game has been written to the specified file OR action has been cancelled. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects the SAVE option in the system menu | Allows the actor to specify a filename | | Writes game data to the file | | Returns to the game's pre-SAVE status | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects the EXIT menu option | See AGM002: Exit game | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects the SAVE option in the system menu | Prompts the actor to specify a filename | | Raises exception because the disk is full | | Selects a different disk | Attempts to save again | | Identifies an existing file with the same name as specified in the Save dialog | | Raises ExistingFileException | | Chooses a different name OR  Agrees to overwrite the existing file | Writes the file | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | AGM002: Exit game |
| **Decision Support** | |
| **Frequency:** | On demand |
| **Criticality:** | Medium |
| **Risk:** | Medium - other files might be corrupted. |

### Save Score

|  |  |
| --- | --- |
| **Use Case Name:** | Save Score |
| **Use Case ID:** | AGM004 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GamePlayer |
| **Preconditions:** | Game system is running and a game is in progress |
| **Postconditions:** | File has been written, or action has been cancelled |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects SAVE SCORE from system menu | Prompts actor to specify a filename | | If the file does not exist, creates new file | | Writes score to the file | | Returns to the game's pre-SAVE status | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects SAVE SCORE from system menu | Prompts actor to specify a filename | | If the file exists, overwrites existing score  Else creates new file and writes score | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects the SAVE SCORE option in the system menu | Prompts actor to specify a filename | | Raises exception because the disk is full | | Selects a different disk, if available | Attempts to save again | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | AGM005: Check previous best score |
| **Decision Support** | |
| **Frequency:** | On demand |
| **Criticality:** | Medium |
| **Risk:** | Low |

### Check Previous Best Score

|  |  |
| --- | --- |
| **Use Case Name:** | Check Previous Best Score |
| **Use Case ID:** | AGM005 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GamePlayer |
| **Preconditions:** | Game system is running. |
| **Postconditions:** | Stored score has been shown to actor. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects Check Previous Best Score | Prompts actor to specify a filename | | Reads the file and returns score in a dialog box | | Selects OK on dialog box to continue | Returns to state before select | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects Check Previous Best Score | Prompts actor to specify a filename | | Finds that file does not exist | | Selects OK on dialog box to continue | Returns to state before select | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | AGM004: Save score |
| **Decision Support** | |
| **Frequency:** | On demand |
| **Criticality:** | Medium |
| **Risk:** | Low |

### Play Brickles

|  |  |
| --- | --- |
| **Use Case Name:** | Play Brickles |
| **Use Case ID:** | AGM006 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GamePlayer or GameInstaller |
| **Preconditions:** | AGM011: Install game has completed successfully. |
| **Postconditions:** | Game has been played. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects PLAY from the menu | Initializes the game and displays the gameboard | | Left-clicks to begin play | Starts game action | | Left-clicks or uses the keyboard to enter commands | Moves the paddle horizontally to follow the mouse track  After each movement of the puck, system checks for a collision with another object.  If puck collides with the ceiling, it is reflected back into the playing area.  If the puck collides with a wall, it is reflected back into the playing area.  If the puck collides with the floor, it ceases to exist. If the maximum number of pucks has not been reached, requests and provides a new puck. If the maximum has been reached, the Lost dialog is presented.  If the puck collides with a brick, defines action by the type of brick. When the puck collides with the last brick, the Won dialog is presented. | | Responds to Won/Lost dialog box with left-click | Returns the gameboard to its initialized, ready-to-play state | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | N/A |
| **Decision Support** | |
| **Frequency:** | On demand |
| **Criticality:** | High |
| **Risk:** | Low |

### Play Pong

|  |  |
| --- | --- |
| **Use Case Name:** | Play Pong |
| **Use Case ID:** | AGM007 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GamePlayer or GameInstaller |
| **Preconditions:** | AGM011: Install game has completed successfully. |
| **Postconditions:** | Game has been played. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects PLAY from the menu | Initializes the game and displays the gameboard | | Left-clicks to begin play | Starts game action | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | N/A |
| **Decision Support** | |
| **Frequency:** | On demand |
| **Criticality:** | High |
| **Risk:** | Low |

### Play Bowling

|  |  |
| --- | --- |
| **Use Case Name:** | Play Bowling |
| **Use Case ID:** | AGM008 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GamePlayer or GameInstaller |
| **Preconditions:** | AGM011: Install game has completed successfully. |
| **Postconditions:** | Game has been played. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects PLAY from the menu | Initializes the game and displays the gameboard | | Left-clicks to begin play | Starts game action | | Repeat the following for 10 frames plus a bonus throw | | | Positions the mouse and left-clicks to send ball down alley | Moves the ball down the alley using a randomly selected algorithm. If collisions result when the ball reaches the pins, moves pins as determined by the physics of the collision. | | Counts number of pins knocked down | | Positions the mouse and left-clicks to send ball down alley | Moves the ball down the alley using a randomly selected algorithm. If collisions result when the ball reaches the pins, moves pins as determined by the physics of the collision | | Computes score | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | N/A |
| **Decision Support** | |
| **Frequency:** | On demand |
| **Criticality:** | High |
| **Risk:** | Low |

### Initialization

|  |  |
| --- | --- |
| **Use Case Name:** | Initialization |
| **Use Case ID:** | AGM009 |
| **Use Case Level:** | Function sub-use case |
| **Actor:** | N/A |
| **Preconditions:** | AGM006: Play Brickles, AGM007: Play Pong, or AGM008: Play Bowling has begun operation. |
| **Postconditions:** | Game is ready to operate. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | |  | Creates the standard instances of the required classes | | Enters the READY state | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects Load Game from the menu | Presents a file chooser box | | Opens the file that is indicated | | Reads and constructs the game objects | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | |  | Runs out of memory while creating objects | | Displays the Error dialog box | | Destroys objects already created | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | N/A |
| **Decision Support** | |
| **Frequency:** | Once per game start-up |
| **Criticality:** | High |
| **Risk:** | Medium |

### Animation Loop

|  |  |
| --- | --- |
| **Use Case Name:** | Animation Loop |
| **Use Case ID:** | AGM010 |
| **Use Case Level:** | Function sub-use case |
| **Actor:** | N/A |
| **Preconditions:** | AGM009: Initialization has operated successfully and the user has left-clicked. |
| **Postconditions:** | Game is completed. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | |  | Generates periodic signals and sends them to the game | | Moves all objects one step according to their movement algorithm | | Checks for collisions and executes the collision algorithms of the objects | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Holds down the left mouse button | Pauses the movement of the game | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | N/A |
| **Decision Support** | |
| **Frequency:** | Once for every playing of the game |
| **Criticality:** | High |
| **Risk:** | Medium |

### Install Game

|  |  |
| --- | --- |
| **Use Case Name:** | Install Game |
| **Use Case ID:** | AGM011 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GameInstaller |
| **Preconditions:** | N/A |
| **Postconditions:** | Game is installed. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects the installer executable to execute | Presents a file chooser to allow selection of a directory in which to place the game files | | Selects a directory | Places game files in the directory | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | |  | Finds insufficient space to which to write files | | Displays the Out of Space dialog box | | Left-clicks on OK button | Exits the program | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | AGM012: Uninstall Game |
| **Decision Support** | |
| **Frequency:** | Very seldom |
| **Criticality:** | High |
| **Risk:** | Low |

### Uninstall Game

|  |  |
| --- | --- |
| **Use Case Name:** | Uninstall Game |
| **Use Case ID:** | AGM012 |
| **Use Case Level:** | System end-to-end |
| **Actor:** | GameInstaller |
| **Preconditions:** | AGM011: Install game completed successfully. |
| **Postconditions:** | All disk space taken up by the game is reclaimed. |
| **Detailed Description** | |
| **Trigger:** |  |
| |  |  | | --- | --- | | **Actor** | **System Response** | | Selects UNINSTALL from the system menu | Presents a file chooser to the actor | | Selects directory where game is stored | Erases files in the directory | | Presents the Uninstall Completed dialog box | | Selects the OK button in the dialog box | Closes dialog box | | |
| **Alternative Courses of Action** | |
| **No. 1:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Extensions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Exceptions** | |
| **List:** | |
| |  |  | | --- | --- | | **Actor** | **System Response** | | N/A | N/A | | |
| **Concurrent Uses:** | N/A |
| **Related Use Cases:** | AGM011: Install game |
| **Decision Support** | |
| **Frequency:** | Very seldom |
| **Criticality:** | Low - can be done manually |
| **Risk:** | Medium - might erase the wrong files |
|  |  |

## Perfil dos Atores

### GamePlayer

**Abstract**: No

**Description**: Usual, frequent user of game

**Skill Level**: Medium

|  |  |  |  |
| --- | --- | --- | --- |
| **Actor's Perspective on Use Cases** | | | |
| **Use Case** | **Importance[[1]](#footnote-0)** | **Personality[[2]](#footnote-1)** | **Relative Frequency[[3]](#footnote-2)** |
| AGM001: Play selected game | Primary | Initiator | High |
| AGM002: Exit game | Secondary | Initiator | Low |
| AGM003: Save game | Secondary | Initiator | Medium |
| AGM004: Save score | Secondary | Initiator | Low |
| AGM005: Check previous best score | Secondary | Initiator | Low |
| AGM006: Play Brickles | Secondary | Initiator | High |
| AGM007: Play Pong | Secondary | Initiator | High |
| AGM008: Play Bowling | Secondary | Initiator | High |

## GameInstaller

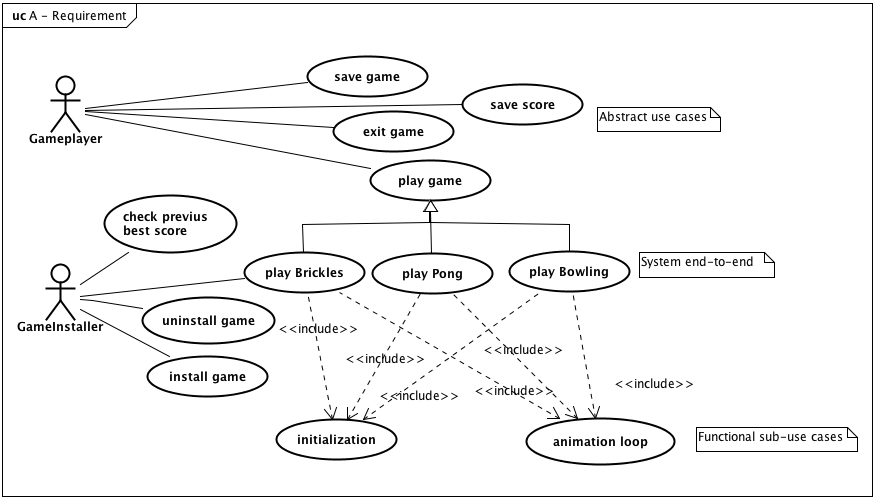
**Abstract**: No

**Description**: Installer of game, infrequent user

**Skill Level**: high

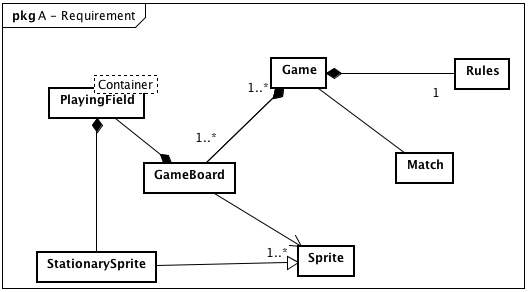
|  |  |  |  |
| --- | --- | --- | --- |
| **Actor's Perspective on Use Cases** | | | |
| **Use Case** | **Importance1** | **Personality2** | **Relative Frequency3** |
| AGM002: Exit game | Secondary | Initiator | Low |
| AGM003: Save game | Secondary | Initiator | Low |
| AGM004: Save score | Secondary | Initiator | Low |
| AGM005: Check previous best score | Secondary | Initiator | Low |
| AGM006: Play Brickles | Secondary | Initiator | Low |
| AGM007: Play Pong | Secondary | Initiator | Low |
| AGM008: Play Bowling | Secondary | Initiator | Low |
| AGM011: Install game | Primary | Initiator | Low |
| AGM012: Uninstall game | Primary | Initiator | Low |

## Modelo de Caso de Uso



## Modelo de negócios

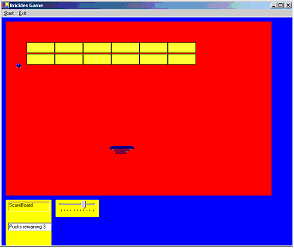
## Modelo de Objeto de Negócios



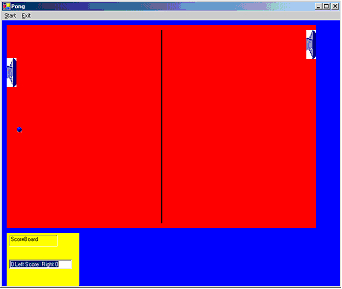
## Tabela de Conceitos

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept | I | U | E | Q | Observation | Cross References |
| Game | X | X | X | X |  | AGM001, AGM002, AGM003, AGM011, AGM012 |
| Bowling | X | X | X | X |  | AGM008 |
| Brickles | X | X | X | X |  | AGM006 |
| Pong | X | X | X | X |  | AGM007 |
| Score |  | X |  | X |  | AGM004, AGM005 |

## Protótipo de interface

Brickles Game Bowling Game



Pong Game

## Glossário

|  |  |
| --- | --- |
| **ACB** | Architecture Control Board |
| **AGM** | Arcade Game Maker |
| **application engineering** | Discipline of constructing a product using the product line architecture and selecting from the inventory of available product line components based on the production plan |
| **ATAM** | Architecture Tradeoff Analysis Method® |
| **CCB** | Configuration Change Board |
| **CEO** | Chief executive officer |
| **CLR** | Common language runtime |
| **core asset** | Reusable artifacts and resources that form the basis for the software product line |
| **CM** | Configuration management |
| **DHR** | Director of human resources |
| **domain engineering** | Discipline of creating, acquiring, and managing the resources needed to build a set of products |
| **FODA** | Feature-oriented domain analysis |
| **IDE** | Integrated development environment |
| **IEEE** | Institute of Electrical and Electronics Engineers |
| **MVC** | Model-view-controller |
| **MIDP** | Mobile Information Device Profile |
| **PLM** | Product line manager |
| **product** | Any saleable or usable output produced from the product line core assets |
| **RUP** | Rational Unified Process |
| **software product line** | Group of products sharing a common, managed set of features that satisfy specific needs of a selected market or mission and that are developed from a common set of core assets in a prescribed way |
| **TE** | Test effectiveness |
| **UML** | Unified Modeling Language |
| **VC** | Version control |
| **WAP** | wireless access protocol |

# Análise

# Projeto

# Implementação

1. Importance is primary or secondary. [↑](#footnote-ref-0)
2. Personality is initiator, server, receiver, or facilitator. [↑](#footnote-ref-1)
3. Relative Frequency is high, medium, or low. [↑](#footnote-ref-2)