

Breaking Better

Game Design Document

Group 16 (Alternative 2)

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January 9th 2026

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Changelog

The following describes changes to features compared to the document version of October, 30th 2025.

Forklift

We added a 'Forklift'. The player can activate/deactivate it and it has running costs. The player can also change between the working modes 'Trash collector' and 'Item Transport', which transports delivered items from the 'Gate' to the 'Storage-Tile'. The player can also increase/decrease its moving speed, which increases/decreases its running costs.

Trash

'Trash' is produced by machines over time and gets placed at empty nearby tiles. They are collidable and prevent the player from building something on a corresponding tile. 'Trash' can be removed by either the 'Forklift' or the player.

Machine

Machines now produce over time 'Trash'. The player can also select when clicking on a machine different recipes, to which accordingly items are being processed. Machines can be upgraded when clicking on them.

Mobility Scooter

The player can mount the 'Mobility Scooter'.

Techtree

In the 'Techtree', different items or recipes can be unlocked, to which accordingly items are being processed.

Player

The player can consume 'Meth', which temporarily increases the manager's movement speed. The player can also give a worker 'Beer', which increases the worker's happiness score, but also decreases the health score. The player can also remove 'Trash'. The player can click on items on the tile-map, after for example a machine containing items has been destroyed, which then appears in the inventory of the player.

Tree

Trees initially spawn in the factory, are collidable and prevent the player from building on tiles with a tree. Trees can be removed by the player.

Grass

Grass initially spawns in the factory but can also spawn afterwards. It is non-collidable, but also prevents the player from building on a tile with grass. Grass can be removed by the player.

Worker

The player can assign to the worker either a specific contract or the task to produce a specific item, to which the worker will autonomously work on. If the worker works on a specific contract, the worker will bring the desired items to the gate. If the worker works on the task to produce a specific item independent from a contract, she/he will bring the desired item either to the storage tile or to the stock market inventory of the gate, depending on what the player chose the worker to do. The worker will decide on which machine the worker will work on depending on the occupancy, level and distance to a machine. During executing a task, the worker can dynamically change the machine she/he is currently working on (for example because another machine has been upgraded). Over time the happiness-score of a worker decreases. The player can also give workers 'Beer', which increases the worker's happiness score, but also decreases the health score. Happiness- and health score influence the movement speed and failure rate of a worker, which includes transporting the wrong items to a machine or dropping items on the ground. If the happiness score drops below a critical point, the worker quits and if the health score drops below a critical point, the worker dies. If the player fires the worker, he has to pay another salary for that worker as severance pay.

Stray dog

Randomly walks around the factory and cannot be controlled.

Import and export

Previously, all items relevant to a contract were collected in storage until the deadline and then withdrawn all at once. Now, the gate is the central drop-off point for contracts. There is a delivery slot for a given contract that can be gradually filled by players or workers until the deadline.

Game Concept

Summary

It all seemed to be too perfect to be true: After graduating from college, you have inherited your grandfather's factory and everything was running smoothly. But then, out of nowhere, something hit you: the diagnosis of lung cancer. You have heard the story of Walter White - but convinced that there is a better path, you decide to be breaking better.

So what are you waiting for? Start producing your first items, fulfill the customers contracts and expand your factory! Assign tasks to your workers and be aware to keep them happy – unless you want to automate the entire factory. Trade on the stock market and discover new items! And remember: Just like in the Software-Praktikum, don't accept contracts you can't handle – because you could get kicked out for that.

Central Game Mechanics

Breaking Better is a real-time game that is about expanding and automating your factory, choosing between different contracts and fulfilling them before their deadline. This also includes managing the worker's happiness, trading on the stock market and improving your reputation, which leads to better contracts or the end of the game and falls and rises with contracts being fulfilled or not.

Graphical User Interface

Player GUI

This game features a 2D top-down view.

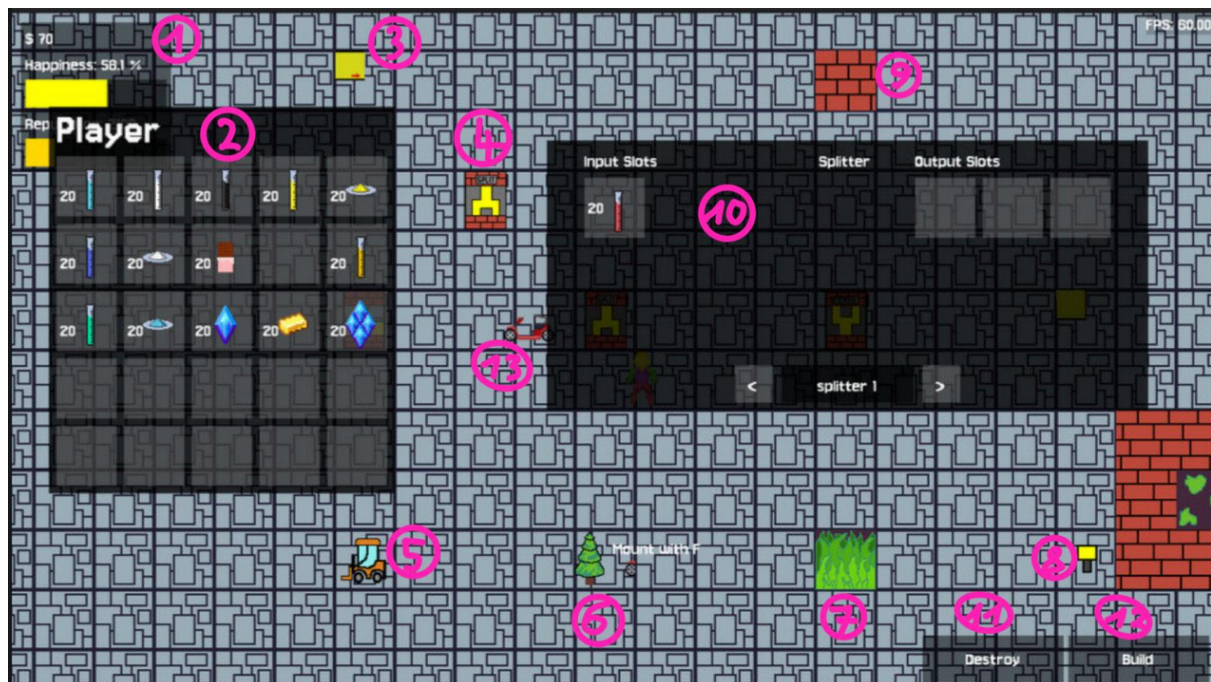


Figure 1: Screenshot from 'Breaking Better', in which the GUI is shown that appears when clicking on a 'Splitter'.

1. Information about money balance, overall happiness amongst workers and reputation. Will feature in the final program also information about currently running contracts.
2. Player's inventory.
3. Pipe
4. Splitter
5. Forklift
6. Tree
7. Grass
8. Light
9. Wall
10. Machine GUI containing input- and output-slots. There is also the option displayed to select between different recipes (here generic as "splitter 1"). This will later also feature the option to upgrade the selected machine.
11. Destruction tool for entering destruction mode
12. Building tool for entering building mode

Controls

This table shows the default key assignment and corresponding actions. The manager is the main actor in the game and is controlled by the player via mouse and keyboard.

Button	Function
w	Moves the manager towards north; moves the manger and the mounted vehicle towards north
a	Moves the manager towards west; moves the manager and the mounted vehicle towards west
s	Moves the manager towards south; moves the manager and the mounted vehicle towards west
d	Moves the manager towards east; moves the manager and the mounted vehicle towards east;
Left mouse button	Selecting tile/machine/worker/forklifter/pipe/computer; Interacting with tile/machine/worker/pipe/forklifter/computer; Place machines; Buy/sell items; accept/reject contracts; read emails; hire/fire workers; interact with menu; upgrade machines; interact with techtree; give worker an order; give workers a beer; mount vehicle; consume meth; Remove machine; remove trash; remove grass; remove tree; interacting with GUI; building machines/pipes;
Right mouse button	Cancel destroy-mode; deselect building in the build mode
Esc	open/close menu; close popped up GUI elements
n	decrease audio volume

m	increase audio volume
p	toggle background music
TAB	Changing the contract that are associated to the deliver-slot in the gate
f	Mount vehicle; get out of the vehicle

Menu Structure

The menu contents and their function for each different menu in the game. Every bullet point stands for a corresponding button.

Main menu:

- "NEW GAME": Start a new game of Breaking Better.
- "CREATIVE MODE": Start a state of the game in which the player has access to most of the game's mechanics that are otherwise hidden behind progression.
- "LOAD GAME": Load a previously saved state of the game.
- "TECH DEMO": Start the in-game tech demo.
- "SETTINGS": Open the settings menu.
- "STATISTICS": Open the statistics overview (list of logged statistics).
- "ACHIEVEMENTS": Open the achievements overview (list of available achievements).
- "QUIT GAME": Close the game.

Settings menu:

- "BACK": Open the superordinate menu
- "CONTROLS": Open the controls menu for personalization of player controls
- "SOUND": Open the sound menu for adjusting music/sound effect volume
- "GRAPHICS": Open the graphic menu for adjusting window mode and resolution

Pause menu (toggled by pressing ESC-key while in-game):

- "BACK TO GAME": Resume the current game closing the pause menu.
- "SAVE GAME": Save the current state of the game.
- "SETTINGS": Open the settings menu.
- "STATISTICS": Open the statistics overview (list of logged statistics).
- "ACHIEVEMENTS": Open the achievements overview (list of available achievements).
- "QUIT TO MAIN MENU": Quit the current game opening the main menu.

Controls menu:

- "BACK": Open the superordinate menu
- List of key/action mapping for changing preferred key assignment

Sound menu:

- "BACK": Open the superordinate menu
- "VOLUME": Volume slider for overall volume
- "MUSIC VOLUME": Volume slider for music volume

Graphic menu:

- "BACK": Open the superordinate menu
- "WINDOW MODE": Button that toggles between window mode and full screen
- "RESOLUTION": Button that toggles between the different resolutions and displays them

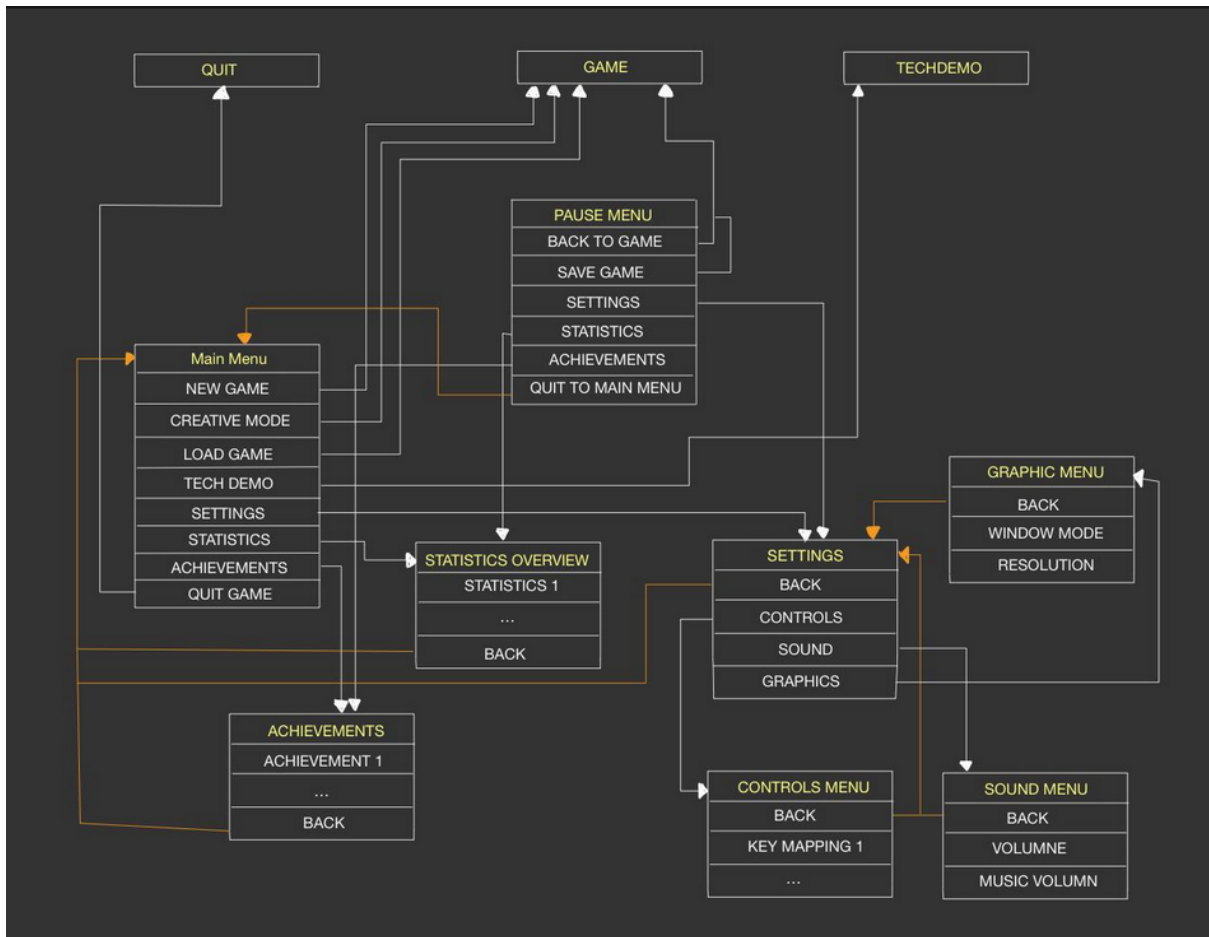


Figure 2: Menu Graph depicting structure and connection between different menu

Technical Features

Technologies Used

Software used to develop the Game and for organisational purpose

- Microsoft C# Version 12
- MonoGame Version 3.8
- .Net SDK Version 8
- JetBrains Rider
- Microsoft Visual Studio Community 2022
- Google Docs
- Gitea
- SonarQube
- Jenkins
- GitInspector
- Mattermost
- Discord
- ChatGPT (5.1, 5, 4o, 4.1, o4mini)
- GoodNotes 5
- Audacity
- Google Translator

Minimal Requirements

Tested on following minimal system

- OS: Linux, Windows 11 (64-bit), MacOS Sonoma
- Processor: 4 cores, at least 2.8 GHz (e.g. Intel Core i7-1165G7 or better)
- Graphics: Intel Iris Xe Graphics or better
- Resolution: 1920 x 1080 (there will be the possibility to change the screen size)
- Memory: 16GB RAM

Game Logic

This section deals with the entire game logic and explains all used game objects.

Game Logic & Actions

This subsection contains all actions that players or the AI (hireable workers or the forklifter) can take to change the game's state.

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
ID01: Move	Player / AI	1. The Player presses W, A, S, D or the AI decides to go to a certain place and calculates the path 2. The Character Sprite moves in the according direction	There has to be no obstacle / colliding game object in front of the direction the game object is moving to	The button has to be released OR There has to be an obstacle in front of the player sprite
ID02: Interact	Player	1. The Player clicks with the left mouse button on an machine/entity 2. A GUI for the corresponding Tile / Machine / Entity will open 3. The Player can change machine settings / control the machine input and output / change the workers behaviour or change the recipe in the machine that decides how to process.	The Player Mouse Position has to match with the machine / tile / entity position the player wants to interact with	The machine settings have changed or the workers behavior has changed
ID02.01: Interact	AI	1. The AI will walk up to a machine or the storage tile or will walk to the gate 2. The AI will control input/output flow of the machine or the inventory slots of the storage tile or pick up items from the gate	The AI does not have another task with same / higher priority it works on right now	Input-slot or Output-slot of a machine has changed or the inventory of the storage-tile has changed or items from the gate have been picked up

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
ID03: Place machine/pi pe/storage- tile	Player	1. The Player clicks on the "Build Menu" Option in his GUI 2. The Player will choose a machine/pipe/storage tile from the build menu 3. The Player places the machine inside the factory with LMB	The Object has a fixed tile size (e.g. 3x4 tiles) and no other game object has to be in those bounds. The Player has to have sufficient funds or a tile / machine of this kind in stock.	The object has been placed successfully
ID04: Remove Machine/Tr ee/Grass/T rash/Pipe/ Storage-Til e	Player	1. The Player holds the RMB for 2s while pointing on the tile containing either a machine, grass, trash, pipe or a tree or storage-tile to remove 2.1: If the tile contained a machine, storage-tile or pipe: The corresponding building costs get refunded and if the machine/pipe/storage-tile contained items, they now lay on the tile. 2.2: If the tile contained grass or a tree or trash: The tile is now empty	The Mouse Position has to match with the machine position.	The machine/grass/tree/trash has been removed from the tile and the tile is now empty. If a machine/pipe or storage-tile had been removed, its price is now refunded and if it had items in its inventories, they now lay on the tile.
ID05: Start with Computer	Player	1. The player presses LMB on the office Computer 2. The corresponding Officer Computer GUI will open	The Player has to be in direct vicinity to the officer computer and the mouse position has to match the office PC's position	The corresponding office computer GUI opened
ID06: Buy / Sell items	Player	1. Action 05 is initiated 2. The player uses LMB on the correct GUI item to open a submenu in which he can select 20 units of a certain item and buy / sell them 3. The prices of the items fluctuate in either a	The Player has to have sufficient money to buy the corresponding amount of items. The Player has to have unlocked the items he/she wants to buy The Player has to have the amount of items he	The ordered amount of items arrived at the gate and the amount of money decreased accordingly OR the amount of items sold disappeared from the gate and the amount of money increased accordingly.

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
		random manner 4.1 (buy items): The ordered amount of items arrived at the gate and the amount of money decreased accordingly 4.2 (sell items): the amount of items sold disappeared from the gate and the amount of money increased accordingly	wants to sell in gate	
ID07: Accept Contracts	Player	1. Action 05 is initiated 2. The player uses LMB on the correct GUI item to open a submenu in which he can select from a various range of contracts. 3. The player accepts a certain contract 4. The accepted contract is now active and has a deadline to which it has to be completed	The Player has to have a minimum amount of reputation for a given contract. There will always be contracts that can be accepted with the lowest achievable Reputation.	The contract is now accepted and active and has a deadline to which it has to be completed
ID08: Reject Contracts	Player	1. Action 07 is initiated 2. Instead of accepting a contract, the player can press a "reject" button which will exchange a contract with another contract with different demands.	The player only can reject a set amount of contracts per time unit, so he cannot farm the best contracts.	The rejected contract offer is replaced by another one
ID09: Read Emails	Player	1. Action 05 is initiated 2. The player uses LMB on the correct GUI item to open a submenu in which he has an overview of emails he has been sent 3. Upon clicking on an email, he can read its contents - Workers will send the player emails containing	The player has to either have hired workers or accepted / completed / failed a contract in order to receive emails	Mail has been read

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
		information about their current work satisfaction - Workers will send the player emails containing lore about random events in the factory - Contractors will send the player emails containing information on how well they handled the contract		
ID10: Hire Workers	Player	1. Action 05 is initiated 2. The player uses LMB on the correct GUI item to open a submenu in which he has an overview of workers available to hire 3. The GUI contains information about how experienced a worker is and how much the player has to pay them.	The Player has to have unlocked hiring workers by earning Reputation points.	Worker has been hired
ID11: Fire Workers	Player	1. Action 05 is initiated 2. The player uses LMB on the correct GUI item to open a submenu in which he has an overview of all workers he has currently employed. 3. The Player can choose to fire workers by pressing the corresponding button on the GUI 4. In the next ingame-hour the salary of the fired worker gets reduced from the managers account balance as severance pay.	The Player has to have hired at least one worker he then can "let go"	Worker has been fired and leaves the factory and in the next ingame-hour the salary of the fired worker gets reduced from the managers account balance as severance pay.
ID12: Open / Close Menu	Player	1. The Player presses ESC while loaded in a level. 2. The menu (see menu structure) will open up	The Player has to be loaded into a level. He can't open the menu while in the main menu.	The menu is opened/closed
ID13: Interact with	Player	1. Action 12 has to be initiated 2. By pressing LMB the	The Menu has to be opened via Action 12	The initiated action has been executed

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
Menu		player can interact with GUI elements in the menu		
ID14: Check on Worker	Player	1. Action 02 has to be initiated on a worker in the factory 2. A GUI will open up which shows the current status of the worker, a quote on what he is doing right now, his current mood / happiness score, what contract he is working on, and other related information	There has to be a worker available	The corresponding information are shown
ID15: Upgrade Machines	Player	1. The player clicks on a machine 2. The player clicks on a corresponding GUI button and upgrades the machine to the next level 3. The machine has been upgraded, so all processing steps are being made faster 4. The player's money decreased accordingly and the next level of the machine is visible by another star above the machine	A machine exists in the map, the player has enough money for the upgrade.	The player's money decreased accordingly and the next level of the machine is visible by another star above the machine
ID16: Unlock within Techtree	Player	1. Action 05 has to be initiated and the player selects 'Techtree'. 2. The Player selects a recipe or item she/he wants to unlock 3. The player unlocks the selected node by a certain amount of money, which accordingly decreases the player's money balance.	Action ID05 is initiated and previous nodes in the techtree have already been unlocked and the player has a sufficient amount of money.	The Player unlocked the corresponding node if he/she had enough money and the player's money balance decreased accordingly.
ID17: Mount vehicle	Player	1. The player clicks on the vehicle 2. The manager is inside	Between the manager and the vehicle is a distance smaller than a	The manager is inside of the vehicle

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
		of the vehicle	tile	
ID18: Drive	Player	.1. The player presses W,A,S,D 2. The manager moves with increased speed sitting in the vehicle in the corresponding direction	Action ID17 has to be initiated	The manager moves with increased speed sitting in the vehicle in the corresponding direction
ID19: Remove trash	Player /AI (Forklifter)	1. The player clicks on the trash or the forklifter decides to pick up the trash 2. The trash is removed from the corresponding tile	Trash has to be in close distance to the manager or forklifter; the AI has decided to run the program 'pick up trash'	The trash is removed from the corresponding tile
ID20: Give a worker a beer	Player	1. The player clicks on an inventory-slot with an beer amount > 0 2. The player drags and drops beer onto a worker, who is in close distance to the manager 3. The happiness-score of the worker, to which the beer was brought, is increased. The more beer was in the inventory, the more the happiness-score increases. 4. The health-score of the worker, to which the beer was brought, is decreased. The more beer was in the inventory, the more the health-score decreases.	ID24 is initiated, The player has an inventory-slot filled with beer and the manager is in close distance to an worker	The inventory-slot that the player previously selected is now empty and the worker has an increased happiness score and decreased health score depending on how much beer the player gave
ID21: Change direction of pipes/Change speed of pipes	Player	1. The player clicks on a pipe 2.1. The direction of the flow of items for all pipes that are directly connected to the selected pipe change 2.2: The transportation speed for all pipes that are directly connected to the selected pipe change and the running costs for	ID02 is initiated	The direction of the flow of items for all pipes that are directly connected to the selected pipe change / The transportation speed for all pipes that are directly connected to the selected pipe change

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
		those change accordingly to the set transportation speed		
ID22: Consume meth	Player	1. The player clicks on an inventory-slot with an amount of meth > 0 2. The player drags meth and drops onto manager 3. Manager gains temporary speed (the more meth was in the inventory, the longer the effect lasts) and the reputation decreases (the more meth was in the inventory, the more the reputation is decreased)	ID24 is initiated. The player has an inventory-slot filled with meth	The previously selected inventory-slot is now empty; the player gained a temporary movement speed gain; the reputation decreased.
ID23: Give worker an order	Player	1. The player clicks on a worker and chooses that the worker either acts according to a certain contract or that he/she produces a certain item. If the player assigns to produce an item, the player also decides to bring the desired item either to the gate or the storage tile. 2. The worker acts according to his given order	ID02 is initiated and the manager is in close distance to an worker	The workers is executing the order
ID24: Open player's inventory	Player	The player presses 'E' and the player's inventory opens.	None	The player's inventory popped up
ID25: Close player's inventory	Player	The player presses 'E' or ESC	Action ID24 is initiated	The player's inventory disappeared.
ID26: Pick up an item from the ground	Player	1. The player clicks on the item 2.1. If the player has enough space to collect the item in his/her inventory, it disappears	An item lays on a tile	Either the item has been collected an added to the inventory or not

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
		from the map and is added to the player's inventory 2.2 If the player doesn't have enough space, nothing happens		
ID27: Drop item on the ground	Worker	1. The worker is affected by a failure 2. The item drops and lays on a tile 3. The item was deleted from the workers inventory accordingly	The worker carries at least one item	An item lays on the map and the item was accordingly deleted from the workers inventory.
ID28: Produce trash	Machines	1. The machine has been working for a certain amount of time 2. In an empty, nearby tile spawn trash	At least one of the tiles nearby the machine is empty	At one of the previously empty tiles in now trash
ID29: Check status information about the manager	Player	1. The player clicks on the manager 2. A GUI pops up showing different stats, like achievements.	None	A corresponding GUI popped up
ID30: Activate/Deactivate Forklift	Player	1. The player clicks on a corresponding GUI button for activating/deactivating the forklift 2. The state of the forklift changed accordingly 2.1 if activated: it has an active hourly salary and is either picking up trash or transporting items from the gate to the storage tile 2.2: if deactivated: doesn't move and has an inactive salary, that is charged	The player has clicked on the forklift	The forklift is now accordingly activated/deactivated; if activated: it has an active hourly salary and is either picking up trash or transporting items from the gate to the storage tile
ID31: Change task of the forklift / change moving speed of the forklift	Player	1. A GUI for the forklift opens 2.1: The player clicks on "trash collector" mode and the forklift is removing trash within the factory 2.2: The player clicks on "item transport" mode and	The player has clicked on the forklift	The forklift is performing according to its settings

ID / Name	Actors	Event Flow	Start-Conditions	End-Conditions
		the forklift is transporting items from the gate to the storage-tile 2.3: The player changed the setting for the moving speed by using a slider and the forklift is moving accordingly and the faster it is moving the higher the hourly salary is		

Game Objects

We used the pre-given set: Alternative 2 for a set of minimum requirements regarding our game. We will use the abbreviation "GO" for "Game Object".

Name	Description	Type
Manager	This is the GO which is controlled by the player. It can interact with every other Game Object through the player. It collides with other Game Objects like machines.	Controllable Colliding Movable Active Selectable
Merger	This Machine can be placed by the Player and will merge items to new items. The machine has an input/output slot, the player and workers can interact with. It collides with the workers and the Player. Over time it produces trash, which spawns on empty tiles near the machine and which then blocks this tile. A merger can be also upgraded for a certain amount of money, which then increases its processing speed of all recipes. When clicking on a merger, the player can choose out of all unlocked recipes for a merger, to which recipe the merger accordingly processes its input items. If the items can be merged, the wished item is placed in the output slot, otherwise chemical waste.	Controllable Colliding Selectable
Splitter	This Machine can be placed by the Player and will split items into their base items, of which they are made of. The machine has an input/output slot, the player and AI can interact with. It collides with AI and the player. Over time it produces trash, which spawns on empty tiles near the machine and which then blocks this tile. A splitter can be also upgraded for a certain amount of money, which then increases its processing speed of all recipes. When clicking on a splitter, the player can choose out of all unlocked recipes for a splitter, to which recipe the splitter accordingly processes its input items.	Controllable Colliding Selectable
Compressor	This Machine can be placed by the Player and will compress the items in its input slot. The Player / AI can interact with its input and output	Controllable Colliding

Name	Description	Type
	slot. Over time it produces trash, which spawns on empty tiles near the machine and which then blocks this tile. A compressor can be also upgraded for a certain amount of money, which then increases its processing speed of all recipes. When clicking on a compressor, the player can choose out of all unlocked recipes for a compressor, to which recipe the compressor accordingly processes its input items. If the items can be compressed, the wished item is placed in the output slot, otherwise chemical waste.	Selectable
Office Computer	This GO cannot be placed by the player, but can be selected and interacted with. Upon interaction, a GUI (as explained in the previous table) will open up and give the player options to accept/refuse contracts, hire/fire workers, buy/sell items, read emails from workers and to unlock new recipes/items from the techtree.	Controllable Colliding Selectable
Pipe	A Pipe is a GO that can be placed by the player that connects with the input/output slot of a machine. A flow direction can be set upon placing the pipe. items will flow through those pipes from machine to machine. When interacting with said GO, the player can control flow direction and speed. It will collide with AI and the player. Pipes have hourly running costs that depend on how fast the transportation speed is set.	Controllable Selectable Colliding
Storage Tile	This tile can be placed by the player, but there has to be at least one in the factory. Interacting with this tile, will open up a GUI that shows all currently owned items and quantities. Workers will go up to this tile in order to transport items to machines.	Controllable Selectable Colliding
Lights on the Walls	Those lights will light up the entire factory. Those are semi-gameobjects, since they are only Sprites with an effect.	
Workers	Workers are GOs that the player can hire and have a salary per hour. A worker can also be fired for a severance pay of the salary for one hour. They can be assigned either to contracts and the corresponding items or to the task to produce a specific item independent from a contract. In both cases, they analyze which machine they have to go to. This is influenced by the machine's occupancy, level and the distance between worker and machine. The workers then analyze what items they need in order to process the desired items, go to the storage-tile, get those and will bring them to the input-slot of the machine she/he is working on. If those previously needed items are not there, they will recursively try to produce items that are needed in the processing line for the desired item. Once a worker gets the desired item he is working for, he will bring it either to the delivery slot of the gate if she/he is working on a contract or to either the stockmarket-inventory of the gate or the storage tile (depending on where the player told the worker to bring the desired item) if the worker works on the task to produce an item. Each and every worker has their own happiness-score, which decreases over time and health-score. The player can also give beer	Controllable Selectable Movable Active Intelligent

Name	Description	Type
	to workers, which increases their happiness-score but also decreases their health-score. Less happiness and health lead to a decreased movement speed and higher rate of failure. Failures primarily manifest as dropped items (visible). In rare cases, workers may also deliver an incorrect item to the machine they are working on, which is immediately visible because the item appears on the ground next to the target (not hidden inside machine inventories). If the happiness-score is too low, they quit. If the health-score is too low, they die. The workers move on their own and can be selected by the player to see their individual metrics.	
Mobility Scooter	This is a game object, the player can mount by interaction. It will increase the player's movement speed and will <i>collide</i> with workers and other game objects.	Controllable Selectable Movable Active
Forklift	The forklifter is an intelligent gameobject. The player can choose between two different tasks: 1) Picking up trash that is being produced by machines or 2) Transporting items that were bought from the stock market, from the Gate to the Storage Tile. These tasks are executed automatically. The player can also deactivate the forklifter. When in action, the forklifter subtracts a specific amount of money from the manager's money per time. The player can control the movement speed of the forklifter which increases its running costs.	Controllable Selectable Movable Active Intelligent
Walls	Walls are game objects that limit the player's available space - since no factory is infinitely big. The player / workers can collide with them, but can't remove / control them.	Non-Controllable
Gate	If the player buys items from the stock-market, they appear in the corresponding inventory of the gate. If the player wants to sell items on the stock market, they have to be in the corresponding amount in the inventory of the gate. The gate is also the place where items belonging to contracts are brought to a corresponding deliver-slot and disappear.	Non-Controllable
Grass	Grass can spawn on an empty tile within the factory. If there is grass on a tile, a machine can't be placed on that tile. The player can walk through grass and remove grass on a tile.	Non-Controllable
Trees	The game starts with some trees on different tiles but trees cannot spawn afterwards. If there is a tree on a tile, a machine can't be placed and grass can't spawn on that tile. The player can't walk through the tree and can remove the tree on a tile.	Non-Controllable Colliding
Items	Items are brought to and from the storage tile or machines and transported through pipes, workers or the manager. They can be traded on the stock market and transformed in different machines to new items.	Selectable Non-Controllable
Beer	By giving a worker an amount of beer as a gift, it increases the worker's happiness-score.	Selectable Non-Controllable
Trash	Trash is produced by compressors/splitters/mergers over time in	Colliding

Name	Description	Type
	nearby empty tiles and prevents the player from placing machines or pipes on the corresponding tile. It can be removed by either the forklifter or the player.	Non-controllable
Stray dog	A stray dog that randomly walks around the factory	Non-controllable Colliding Movable

Items

This table shows all different items and the recipes/machines/ways used to obtain them.

Name	How to obtain
Hydrogen (H)	bought from Market, Splitter(Water)
Oxygen (O)	bought from Market, Splitter(Water)
Carbon (C)	bought from Market, Splitter(Air)
Nitrogen (N)	bought from Market, Splitter(Air)
Gold (Au)	bought from Market
Air (N8O2C)	bought from Market
Water (H2O)	bought from Market
Glucose (C6H12O6)	Merger(6xCarbon,12xHydrogen,6xOxygen)
Candybar	Compressor(10xGlucose)
Ethanol (C2H6O)	Merger(2xCarbon,6xHydrogen,1xOxygen)
Beer	bought from Market, Merger(19xWater,1xEthanol)
Gasoline (C8H18)	Merger(8xCarbon,18xHydrogen)
Meth (C10H15N)	Merger(10xCarbon,15xHydrogen,1xNitrogen)
Diamond	Compressor(100xCarbon)
Gold Ingot	Compressor(10xGold)
Jewelry	Merger(4xGold Ingot,1xDiamond)
Chemical waste	Will be produced, if wrong items are combined in the input slot and processed. Chemical waste appears in the output slot, can't be removed by hand and disappears after a certain amount of time.

Game Structure

Game Phases

Techdemo

There will be a tech-demo, in which 1000 workers (active game objects) will walk around the factory and of every gameobject, that is part of the game, will be at least one instance.

Early Game

The player starts off with a factory that already has one basic merger, splitter and compressor. All the other tiles within the factory either contain grass or trees, which prevent the player from placing other machines on those tiles. In the beginning the player's reputation amongst possible contract partners is at a relatively low level, so contracts that are quite easy to fulfill, but also don't bring the highest rewards, are offered to the player. So in the early game the player decides which offer is going to be chosen and according to that, the player removes grass/trees in order to make space, place corresponding machines that are going to help him and buy from his initial given money some of the items from the stock market, that are going to be used in the necessary processing steps. Once the player accepts a contract, he transitions to the middle game.

Mid Game

The middle game is about building the fundamentals for the late game. Therefore the player needs to fulfill currently accepted contracts, which is rewarded by the corresponding amount of money for each fulfilled contract and an increased reputation. A higher reputation leads to more rewarding but also more risky contract offers. Not being able to fulfill accepted contracts before their deadline means that the player won't earn the corresponding money and that the reputation decreases. The player can manually execute all the necessary processing steps for a certain contract by going to the storage-tile, selecting the needed items, putting those onto the input-slot of a certain machine and bringing the end product of the output-slot to the gate, from where they are collected for the respective contracts and leave the factory. The more is missing for a certain contract at its deadline, the more the reputation decreases. The player can use the earned money to hire workers in order to automate the factory. Those can be allocated to different tasks, for which they autonomously select a machine to go to and work on. Every worker has his own happiness-score, which influences how fast he is moving and his failure rate. This happiness-score decreases slowly over time but can be increased by giving them beer. The player can also automate the factory by connecting machines to the storage-tile via pipes, which transport items. There is also the possibility to let a forklifter drive around and either transport delivered items that were bought from the stock-market, from the gate to the storage-tile or to let it pick up trash that is being produced by machines over time. The player can also spend money on upgrading the processing speed of individual machines or to unlock new items in the techtree, which enables the machines to process those. In the

middle game the player will expand the factory, but because the space within the factory is limited, it is also the player's task to manage the space efficiently.

Late Game

The game is won, if the player has enough money to be able to buy the medication for the manager's cancer treatment. Therefore the player needs to enter the late game by reaching a certain level of reputation, which comes with high rewarding but also highly risky contracts in order to reach that amount of money. Not being able to fulfill an accepted contract of that category within the deadline, leads to huge drops of the reputation. The game is lost, if the reputation drops below a critical point or the money balance drops below zero. The late game still includes all the central game mechanics mentioned in the "Mid Game" section.

Statistics

During gameplay, certain data will be collected in order to feed statistics, the player can view via the corresponding GUI elements.

- Total / Mean Worker Health
- Total / Mean Worker Happiness
- Total Money Earned
- Total Money Spent
- Total Reputation Gained
- Total Reputation Lost
- Amount of Items processed
- Amount of Items Shipped
- Amount of Contracts Accepted
- Amount of Contracts Failed
- Amount of Contracts Completed
- Number of total Workers
- Days Since Last Factory Incident

Achievements

During Gameplay, certain actions, or a certain amount / order of actions will unlock achievements. Achievements can be earned **once** per GAME SAVE and be viewed via the corresponding GUI Menu.

List of Achievements:

- Breaking Worst - Discover Methamphetamine
- Unbalanced - Make your first Million
- Work/Life Balance - Have a worker quit
- Temu - Have a very low mean happiness score
- 1964 - Gain a lot of reputation
- Getting Started - Complete your first Contract

- Should've stayed in college - Fail your first Contract
- The fifth Element - Unlock 5 Items total

Screenplay

This Section includes Information about the game's story and concepts including art.

Story

The manager, a recent business graduate, has inherited his grandfather's factory but also gets the diagnosis of lung cancer. His goal is to earn enough money to buy the medication for the cancer treatment. Therefore the manager starts to conquer the industry by accepting various contracts and expanding his factory. But while reaching for more lucrative contracts, the player has to take care of his reputation, because once it is below a critical point, no contract partner is going to give some offers anymore and the business and therefore the plan for his cure fails.

Storyboards



Figure 3: Screenshot from 'Breaking Better', in which the GUI is shown that appears when clicking on the 'Gate'.



Figure 4: Screenshot from 'Breaking Better', in which the GUI is shown that appears when clicking on the 'Computer' and then 'Job Market'.