

Skyrim Survival Needs Modification

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As written by Sheng-Han Chen
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Senior Project Report

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Introduction

The Elder Scrolls: V – Skyrim is one of the four games in The Elder Scrolls series, and like all three other games, Skyrim has made food available to the players. Unlike in previous games, where the food was used as alchemy ingredients, the food in Skyrim is a standalone potions system implemented as a cooking system that is neither very powerful nor has a significant impact on gameplay. Most of the time, the food is left where it is; it fails to have enough weight to effect ratio to be worth the effort unless one is attempting to abuse a specific mechanic.

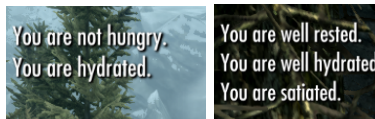
Therein lies the problem: Food is mostly a superfluous tacked on system that would probably be better off remaining merged with the alchemy and potions system as per earlier games.

The issues with the food system leads us to a second, related problem along the lines of survival necessities: Sleeping. Sleeping is mostly useless in-game, providing a slight boost but no penalty to working throughout the night and no incentive to finding an inn to sleep in unless someone is heavily roleplaying their avatar.

The intention with this mod is to make these two functions relevant to a player's gameplay again, and not just to make the player eat, drink, and be concerned with finding necessities. It is intended to tie together several other wasted mechanics like walking without being in stealth, riding a horse when sprinting on foot is actually faster than riding said horse, and cooking food.

Application

The modification itself will overlay the Skyrim system with penalties and alerts every so often to incentivize eating, drinking, and sleeping regularly. Players should experience a logged alert at the top left-hand corner of the screen



Messages that pop up when status changes

If a player eats and drinks regularly, they should also experience mild bonuses to their abilities. Or penalties, as it might be.



Should they decide to run instead of walking or riding a horse, they will find that their character will get hungry and thirsty more often.



If you're sprinting, you're going to get hungry more quickly.

Other changes to gameplay include added spells to aid in needs procurement, a restriction in gathering food from a farmer's fields, and rebalanced weight. As weight is a precious commodity in the game, the intention is to make it too cost-prohibitive to carry around more than a day or two's worth of food. *Skyrim* is a land of plenty... but that doesn't mean that carrying around a month's food won't come at a price – or that the food won't spoil.



A “spell” for foraging

To install this application involves unzipping the containing folder and putting the scripts folder as well as the .esp file in the Skyrim Data folder.

Background

The game The Elder Scrolls: V – Skyrim is one of four games in The Elder Scrolls series. These games are commonly modified by players and programmers to enhance gameplay because the company has made available the tools to do so. Through the creation kit Bethesda Softworks has made available, users can add additional items, effects using a library of smaller effect definitions – or even script their own effects using the provided compiler in the language known as Papyrus, and quests among other things.

To create a modification in the game, the first basic requirement is the game itself, obviously, but the second one is the creation kit. Once opened, the creation kit makes available several .esp and .esm files that govern the game itself along with any other .esp/.esm modifications that may have been installed. These can be set as active and manually altered, or one can set the files as source files and use their resources to create new objects and effects. The latter is the typical method used, even within update patches from Bethesda Softworks. Without the basic source files, many of the large effect definitions and most of the objects’ resource references (including the map itself) are no longer available to use in the modification; however, one can build from ground up and recreate the definitions offered in their own format using the atomic structures and personal scripts already offered, but that would no longer be the Skyrim game and more a new game running atop the Skyrim game engine.

Assuming that one has set the basic game files as source files, one can then ‘create a new reference’, whether that be a quest, item, spell, or otherwise. This can either link in references from inside the files, or link in resources from outside the files, like scripts, meshes, sounds, and textures. It’s possible to create new cells from the World menu by World – Cell and right-click down to New, or create a new item by clicking into one of the item types and then doing right-click into New as well. Then the edit box for the item will show up with the request for a name (both a reference ID tag and an actual name), meshes and textures or references to another item that will be the base to the new item, and any effects applied to the item.

There are other modification possibilities outside of the provided kit, which tend to involve installing an executable to expose more functions to the scripts that are not available via the default kit. Two such modification possibilities are the well-known Skyrim Script Extender and Script Dragon; the former is more commonly seen in the modding community.

Design

The intention for this project is to make a survival needs modification in The Elder Scrolls: V – Skyrim commercial game. This takes place in three parts. One, the survival needs system itself. Two, food

re-balancing so that cooking food makes sense in the context of the survival needs system. Three, extra ways of needs procurement.

The survival needs system itself has several goals: to ensure that the player attends to the needs of eating, drinking, and sleeping regularly with some realism. After some research and re-designing the numbers behind such a system, the system has been divided into four parts – wellness, hunger, drinking, and sleeping. All four are based on a number scale that varies from healthy to in poor health. Hunger does not have consequences beyond minor penalties, but should someone really neglect their needs, wellness, drinking, and sleeping do.

For hunger, drinking, and sleeping, values decrease every thirty minutes in-game time. The player will be expected to attend to the needs every six hours when the system first starts warning the player, being given two more hours to attend to their needs before penalties are applied as further incentive. Both hunger and thirst are affected by whether or not the player's character is sleeping. For the wellness, the values are linked with how much time the player spends in a starvation state – or how much time out of it and eating consistently.

The four systems are detailed below:

Hunger:

- This ranges from between 0 and 52
 - 0 being the starvation state.
 - 52 being completely full
- This decreases at a rate of 2 points per thirty in-game minutes.
 - Sleep halves this rate.
 - Running increases this rate.
- Two hours before a new penalty is applied for each stage, an alert will tell the player to drink.
- The hunger stages are five in total.
 - Satiated (Bonus to Player) – 52 points to 49 points (2 hours)
 - Not hungry (No effects) – 48 points to 33 points (8 hours, alert at 36 points to eat)
 - Hungry (Very Mild penalty) – 32 points to 17 points (8 hours, alert at 20 points to eat)
 - -3% to stamina regeneration, -%3 magicka regeneration
 - Very Hungry (Mild Penalty) – 16 points to 1 points (8 hours, alert at 4 points to eat)
 - -6% to stamina regeneration, -%3 magicka regeneration
 - Starving (Medium Penalty) – 0 Points
 - -10% to stamina regeneration, -%3 magicka regeneration

Wellness:

- This ranges from 0 and 120 points
 - 0 being death
 - 120 being completely healthy
- For every six hours the player spends in the starvation state, the points tick downward by one.
- It takes a total of 30 days for the player to starve to death after entering

starvation.

- For every twelve hours the player spends above the very hungry state, the player's hunger bar will tick upward by one.
- A weekly marker will progress severe penalties.
 - "General feeling of malaise." Health regeneration -30%.
 - "Some weakness". Health regeneration -60%.
 - "Major weakness." Health regeneration -90%. Carry Weight -50.
 - "Death".

Thirst:

- This ranges between 0 and 144
 - 0 being death
 - 144 being well hydrated
- This decreases at a rate of 1 point per 30 in-game minutes
 - Sleep halves this rate.
 - Running increases this rate.
- Two hours before a new penalty is applied for each stage, an alert will tell the player to drink.
- The hunger stages are 6 in total:
 - "Well hydrated" (Mild Bonus) – 144 points to 141 points (2 hours)
 - "Hydrated" (No bonus) – 140 points to 124 points (8 hours)
 - "Thirsty" (Very Mild Penalty) – 134 points to 109 points (8 hours)
 - Magicka, stamina regeneration -15%.
 - "Very thirsty" (Mild Penalty) – 108 points to 93 points (8 hours)
 - Magicka, stamina regeneration -30%.
 - "Dehydrated" (Stronger penalty) - 92 points to 44 points (24 hours)
 - Magicka, stamina regeneration -60%.
 - "Very Dehydrated" (Strongest penalty) – 54 points to 0 points (22 hours)
 - Magicka, stamina regeneration -90%.

Sleep:

- This ranges from 144 points to 0 points
 - 144 being well rested
 - 0 being exhausted
- This decreases at a rate of 1 point per 30 in-game minutes
 - Sleep restore this at 2 points per 30 in-game minutes
- There are 6 stages:
 - Well Rested
 - Not Tired
 - Tired (Mild penalty)
 - Very Tired (Medium penalty)
 - Exhausted (Major penalty)
 - Hallucinating (Extreme penalty)

The second part of the modification, foods re-balancing, involves re-weighting the entire list of foods in the game and changing the recipes. Some weights don't entirely make sense in the context of their ingredients. In addition, to create a sense of 'scarcity' in the game and pressure to the system, heavier food weights to limit the amount of food the player can carry will be employed, in most cases doubling

the food weight. Based on the food weight and the food's status as cooked, stewed, or raw, the food's restoration value in the context of the needs system will be calculated.

The formulas to be used are below:

$$\begin{aligned} \text{if stew: } \text{adjusted weight} &= \text{weight} - 0.5 \\ \text{if not cooked: } \text{adjusted weight} &= \text{weight} * 0.75 \\ \text{points recovered} &= \text{weight} * 4 \text{ points} \\ &(\text{modified by user scaling option}) \end{aligned}$$

It will also tag each food with protein, fibers & vitamins, or carbohydrates. The last three 'meals' of food will be recorded and should a food type exceed 60 percent of the past three meals, the points recovered will get progressively lower until the points hit zero. The trio of types ensures that a player can eat completely vegetarian should they wish.

The third part of the modification will offer the player extra means of needs procurement. The original game offers limited means of food procurement, only two methods of cooking food, and restricted sleeping locations. The ways to find food are to: pick it from a farmer's field, hunt animals, buy it, or steal it. The two ways of cooking food are at a designated cooking pot or oven. The sleeping locations are restricted to beds in the inns. For a needs mod to be viable, there must be both more ways of getting food – and less of it in some sense.

Therefore, this mod provides foraging and sleeping as extra ways of managing needs procurement. The original design did call for fishing, trapping and cooking anywhere, but it was not implemented. The ideas behind the design, however, are still delineated below.

Foraging will allow the player to forage for food, the outcome of which is semi-random and affected by the tools the player has in their inventory as well as their location. Sleeping placement will occur in two different ways. The player can choose to use a bedroll, which will imply light penalties to sleeping, or not use a bedroll and incur even more penalties. If the player does not wish to incur penalties to sleeping, they must use an inn.

Fishing should have been implemented similarly to traps in which a player sets up a fishing rod or fishing net and leaves it for an in-game hour or two before checking back to see if there was anything caught.

Cooking should be done over a fire and be viable no matter if the player has tools to cook or not. However, the more tools applicable to cooking a player has in their inventory, the more recipes will be available. All the recipes would have remained available at an original cooking site.

Implementation

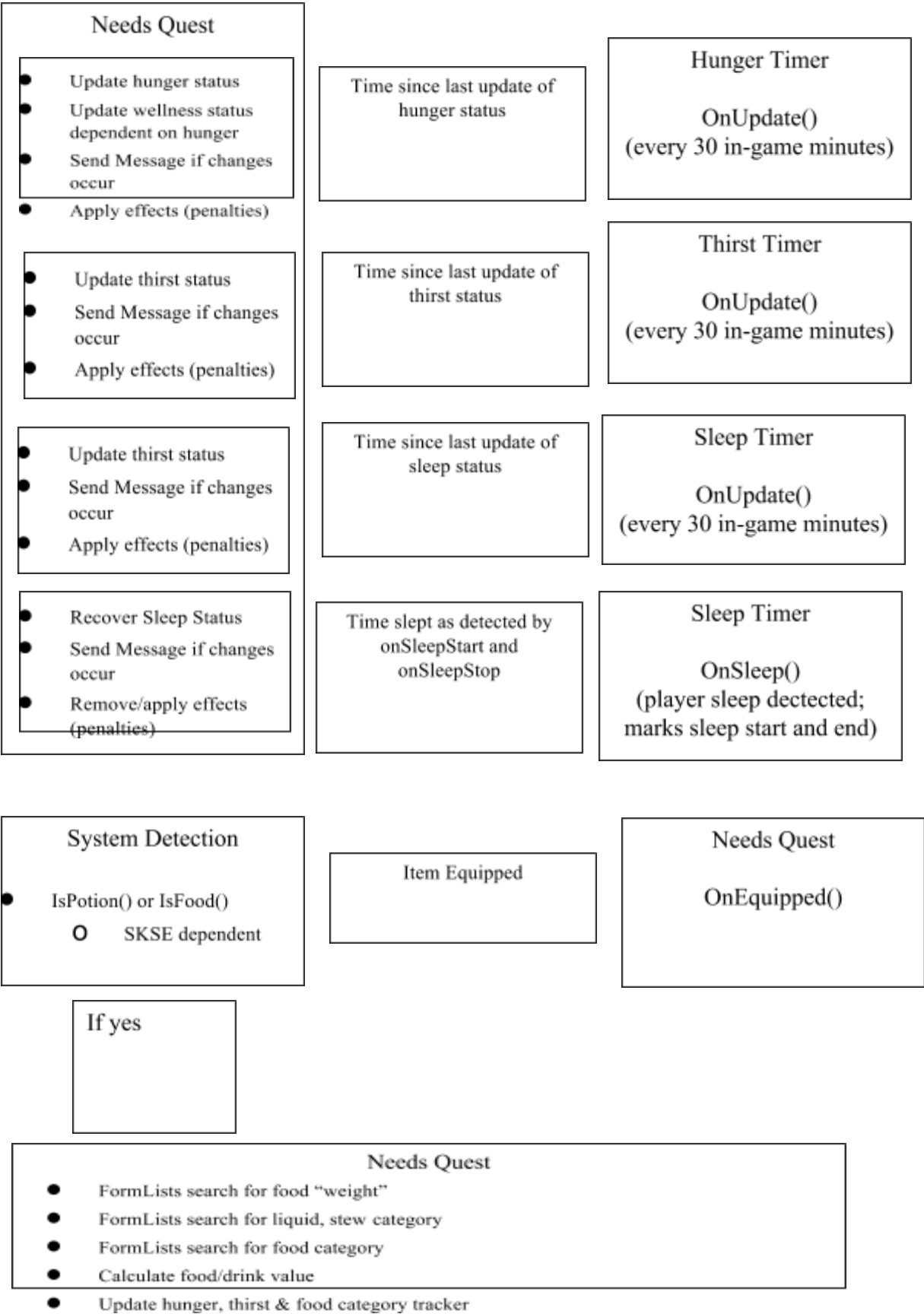
Necessity System

This is the system that keeps track of the player's hunger, thirst, rest levels, and wellness. It will be started through a quest and tracked via multiple magical effects that contain needs increment scripts. These scripts will change the levels of hunger, thirst, and sleep depending on time passed. Another script will be attached to the player themselves to examine the needs intake – food, water, and sleep. Utilizing the OnEquip event can identify the foods and liquids that the player eats, and the OnSleep function will track the sleep that the player gets.

Keeping track of the food categories will involve FormLists that contain every food in the vanilla game – anything that isn't in the vanilla game will be categorized as 'other' if they don't contain corresponding keywords unless the Skyrim Script Extender is active and can identify otherwise by the name. These food categories are carbohydrates, vitamins, and meat. Stews and soups are a separate categorization that apply a -0.5 change in food volume if the script detects that the item is in that category. The third categorization would be raw and cooked foods – this is, in the vast majority, determined by the "VendorItemFoodRaw" keyword.

Magical Effects will be applied at appropriate stages to create penalties for the player unable to maintain his or her needs, or reward them for maintaining a good diet. The specifics of the numbers were mostly declared in the above design.

The system’s flow looks like the below flow diagram:



Needs Procurement

The player has needs to be satisfied. This is limited in the original game. In order to obviate this three spells will be added to the list: “Foraging”, “Sleeping”. (Cooking was unfortunately, unable to be implemented into the final version in time).

What these spells will do is, using the script it will search through the player’s inventory for associated items. After which it will do as the player asks, presenting the associated menus. For sleeping, that is the sleeping menu associated with how long the player wishes to sleep via first generating a false ‘bed’ and activating it. For foraging, that is a menu that gives the player the option to search for specific things; in this case it pulls up food, water, and firewood. The lists are pre-written into the spell, so the item can be given to the player easily. It is item sensitive in that it will ask if the player is sure they want to forage without specific tools.

Analysis / Verification

To verify that the mod itself worked as intended, the system was run from full needs to death or max penalty on each necessity – hunger, thirst, and sleep, and checked for whether or not the effects actually were present, and also observed to check for spelling errors on the messages that warned about each needs on the top left.

It was also checked for general food hunger refilling by feeding the character foods from each time. There was not, unfortunately, enough time to iterate through the entire list of available foods. However, the testing with added foods did result in a response for the majority of foods, putting them into the other category.

The spell that required items – namely the foraging spell – was checked to see if they responded to the items. The foraging for firewood did indeed respond with a popup to check if the player was certain without the woodaxe and also increased the amount of wood collected if the player had the wood axe.

Relevant Works

There have been several needs mods already created; the major ones being Realistic Needs, Imp's Complex Needs, and the relatively new iNeeds system. Realistic Needs and Imp's Complex Needs both have not been updated in a while; Realistic Needs is officially not supported by the author and Imp's Complex Needs has had erratic support.

Imp's Complex Needs is a highly complex, complete system that keeps track of many real-world nutrition values for each and every food item and utilizes these to dole out penalties and rewards to the player. Unfortunately, this means that every food item needs to be tagged with the nutrition values and is often more work than people want to do for compatibility with the system for their own food. Its timing system is completely based on in-game time.

Realistic Needs is less complex and significantly simplified. Instead of keeping track of nutrition, it merely keeps track of how large a meal is. The compatibility is easier to effect when other people create food items, but still requires people to create a compatibility patch for their own modifications as the while the changes are fewer than Imp's Complex Needs, they aren't negligible enough to function without Realistic Needs installed. It adds several rebalances to the food weights, items to allow out-of-town cooking, sleeping, and water procurement. While water procurement is in all three mentioned modifications, Realistic Needs has the most complete - water detection happens just about

anywhere. It also has a rate adjustment for each need.

iNeeds is the least complex of the three mods but also the most compatible – but that’s mostly because it’s been actively maintained; contrary to initial impressions, most of this has been hand-maintained. It does have a weight adjustment slider for people who like to adjust their own values, and rate adjustment for each need like Realistic Needs. It's got a finer adjustment system than anything else. It doesn't provide any extra items; it's just a lightweight needs chassis.

The difference between this project and previous needs mods will mainly be in the complexity and ease of compatibility. The intent is that there will be no extra compatibility patch needed; so long as a food is assigned the appropriate keywords, it will function as it should – and even if it isn't functioning as a tagged food, it will still participate in the system, unlike Realistic Needs or Imp's Complex Needs. There are several basic keywords already used in the original Skyrim that will make this possible. In addition, while not as complex as Imp's Complex Needs, it will be more so than Realistic Needs, having a vague nutrition system. It will also provide several procurement options that none of the above have included. Not to mention that none of the above mods provide a reason for other modes of movement.

Future Work

Foraging

The foraging system could use more sensitivity towards context, such as not just a vague adjustment of regional items but also water detection. It could also use some touch ups like having water available at wells and from shopkeepers. Salt, as a primary ingredient that is not common enough to make cooking worth it in Skyrim, could also be included via the northern shoreline.

Necessities

The system works well as is, but it could use some touch ups, especially in the matter of the nutrition rankings. Some items can serve as both, but are identified as only one. Outside foods are often not identified as a type (still acceptable as ‘food’) unless tagged, and some work on compatibility could be done to alleviate this problem. In addition, finer control over the system like the ratios between each hunger stage could be added.

Other subsystems

As mentioned, the cooking subsystem was not implemented. Also not implemented was the fishing and trapping systems. Both of which would make this modification far more complete and contained within itself instead of relying upon other modification.

GUI

The UI was unfortunately primitive, and lacked options. Due to a lack of a .swf editor and time, a head’s up display for the current needs status could not be completed, nor could an options menu based on the MCM modification.

Conclusion

Although the basic goal of the project has been hit – to implement a needs system - there still is a lot that can be done to improve and make this a more self-contained modification.

A lot of the supporting subsystems could not be implemented in the time available, and the limitations of the exposed functions provided meant that it might have been a better idea to implement a less complex version of the modification; the Skyrim engine does not provide normal lists, hashmaps, or a multitude of useful tools. Nor does it provide access to many of its internal flags that would have been useful. It also doesn't, actually, allow access to even item weights and the project had to work around that issue by issuing defaults or utilizing SKSE presuming it was available. The sleep anywhere addition was also more complex than expected; the project had to generate a piece of furniture first before activating the furniture in order to get the player to go to sleep. None of that were easy work-arounds.

The needs system did hit the major points: encouraging the players to eat, sleep, and drink consistently (at least once a day), discouraging eating the same food repeatedly, and is more compatible with outside foods than the other mods. The modification wasn't a complete success, but it got the job done.