



March 21-25, 2022
San Francisco, CA

Space Station 13: Behind one of the Largest Open Source Games

Nathan Riemer

Maintainer / Head Admin



@Mothblocks

#GDC22



What?

- 1,200 stars
- 3,400 forks
- 1,000 contributors
- 86,000 commits (and counting!)
- 10-20 community contributions per day
- 6th most discussed repository in 2017 (Octoverse)

tgstation/tgstation

The /tg/station branch of SS13

 986 Contributors  2k Issues  1k Stars  3k Forks



Ten most-discussed repositories

	KUBERNETES/KUBERNETES	388.1K
	OPENSIFT/ORIGIN	91.1K
	CMS-SW/CMSSW	80.1K
	MICROSOFT/VSCODE	78.7K
	RUST-LANG/RUST	75.6K
	DOTNET/COREFX	75.2K
	TGSTATION/TGSTATION	74.8K
	NODEJS/NODE	66.3K
	SERVO/SERVO	54.9K
	ANSIBLE/ANSIBLE	53.9K

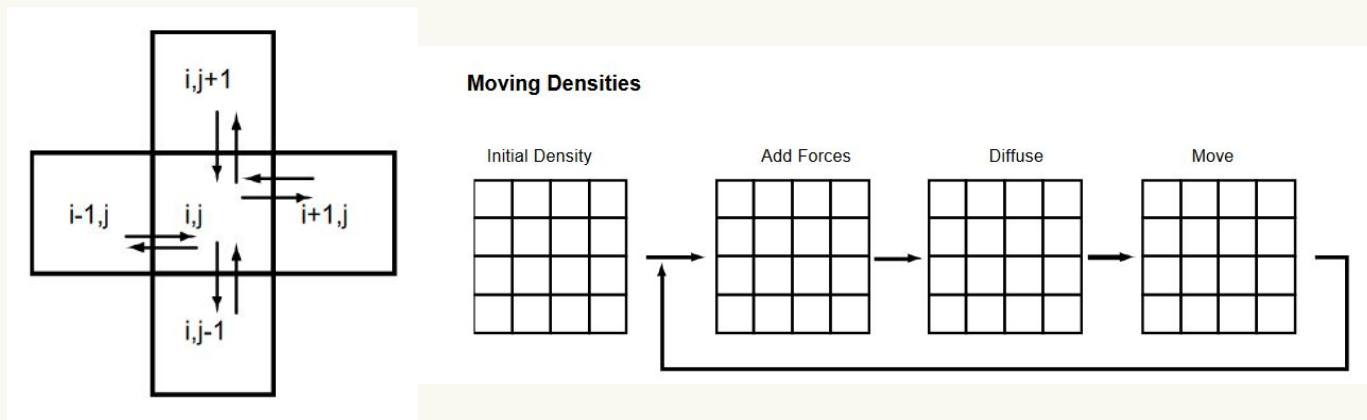
Outline

- How Did We Get Here?
- Our Open Source Environment
- Pros and Cons of Our Model

How Did We Get Here?

2003

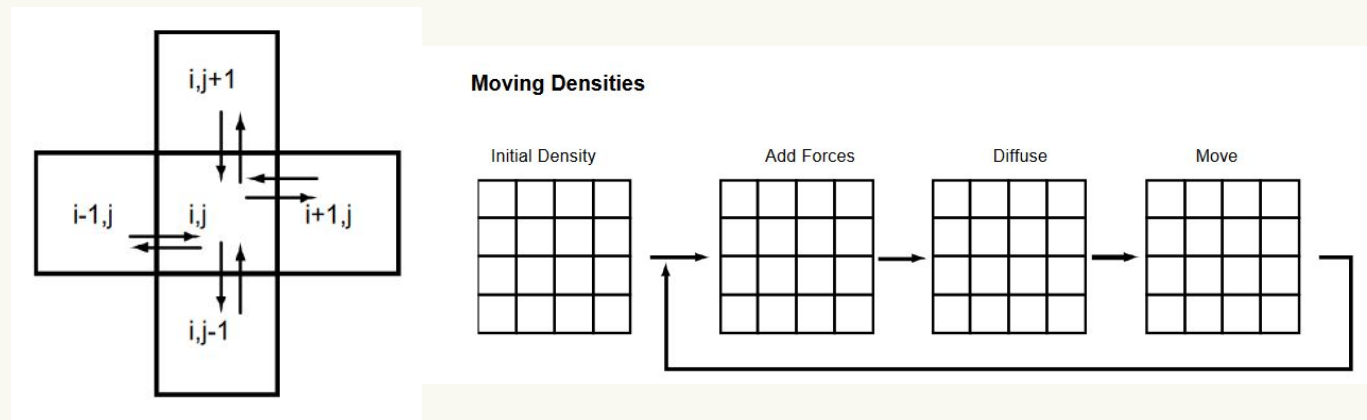
Originally built as a fluid simulation demo



2003

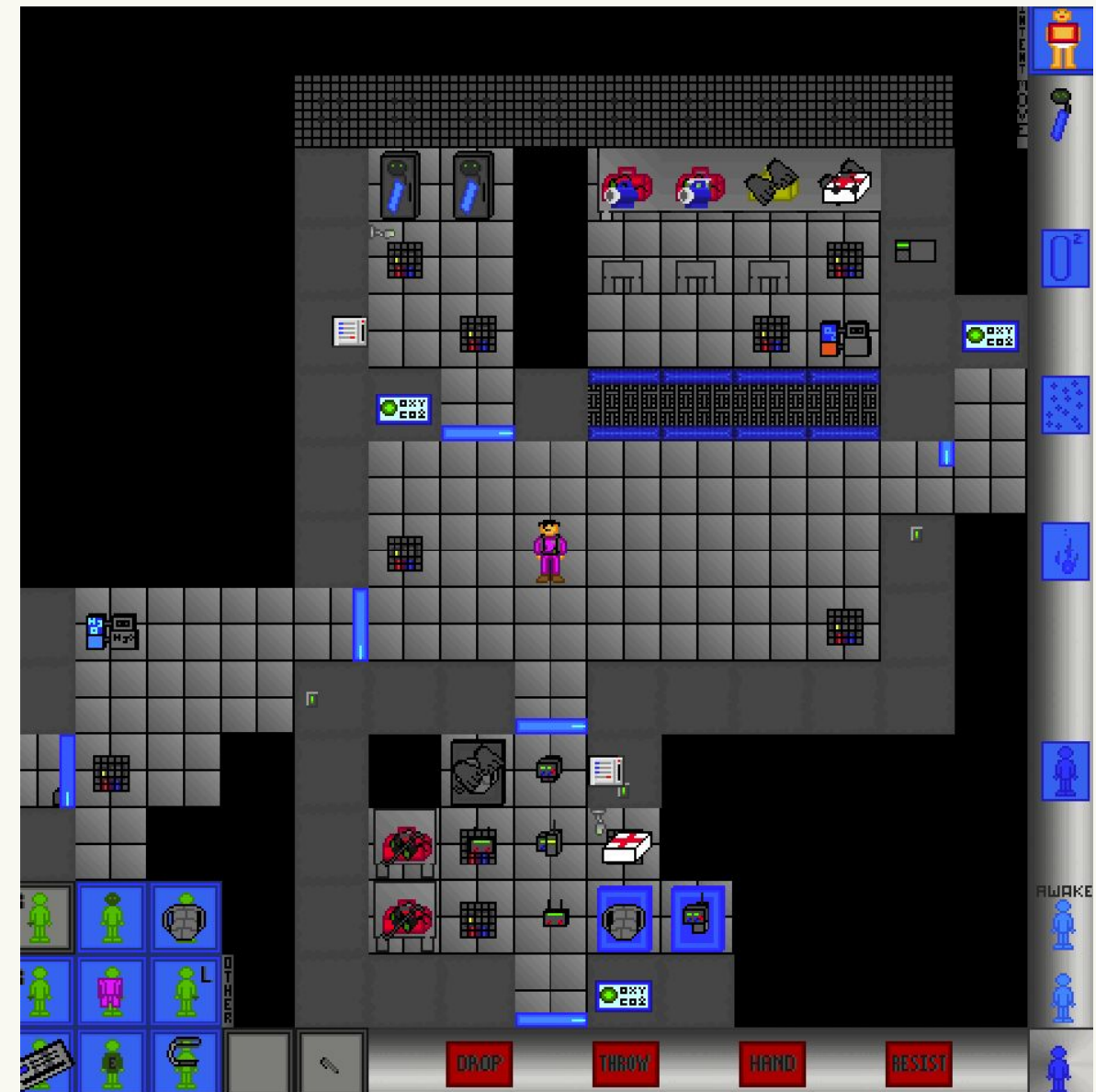
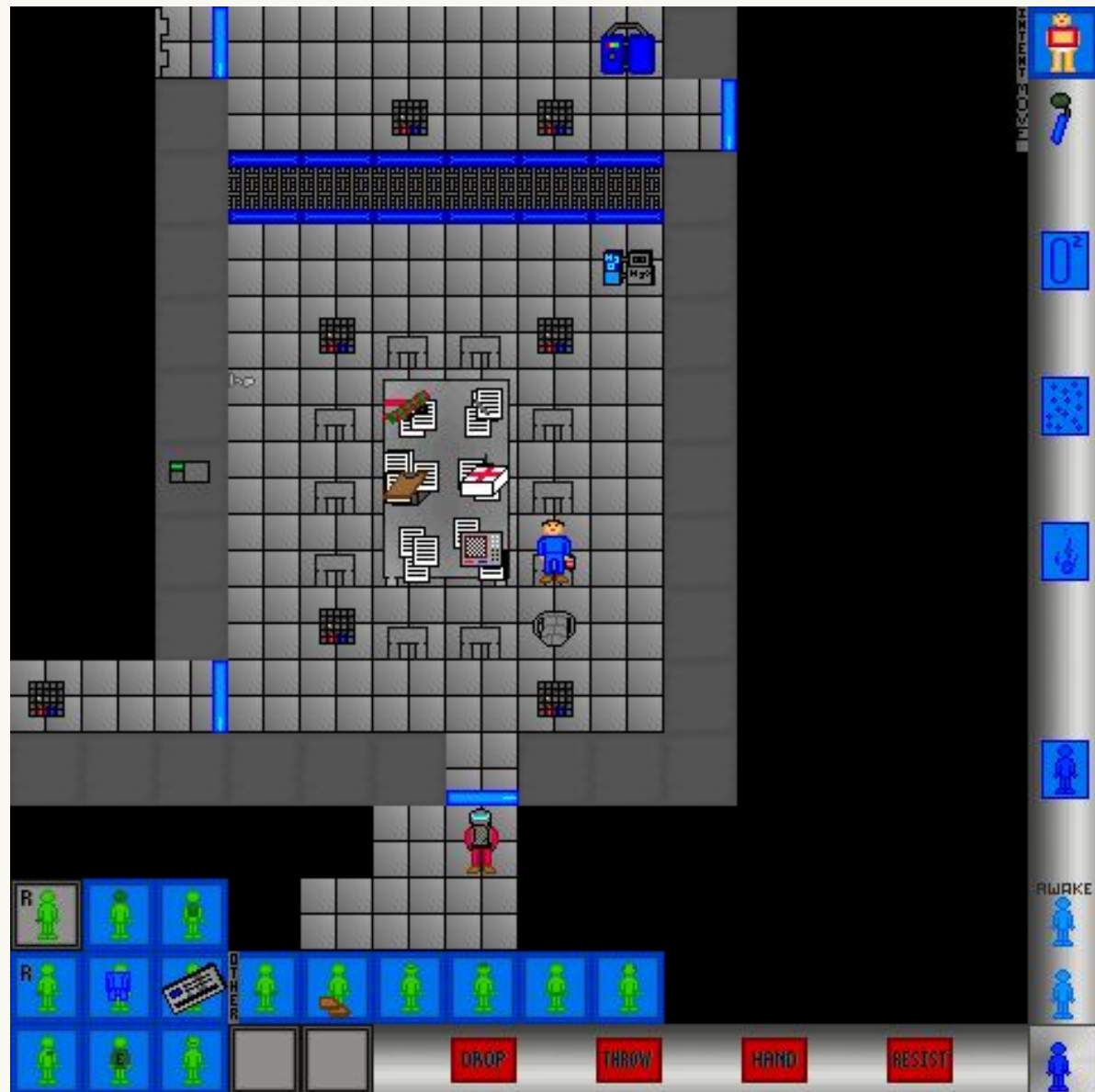
Originally built as a fluid simulation demo

...on an engine built for
MUDs!



2003

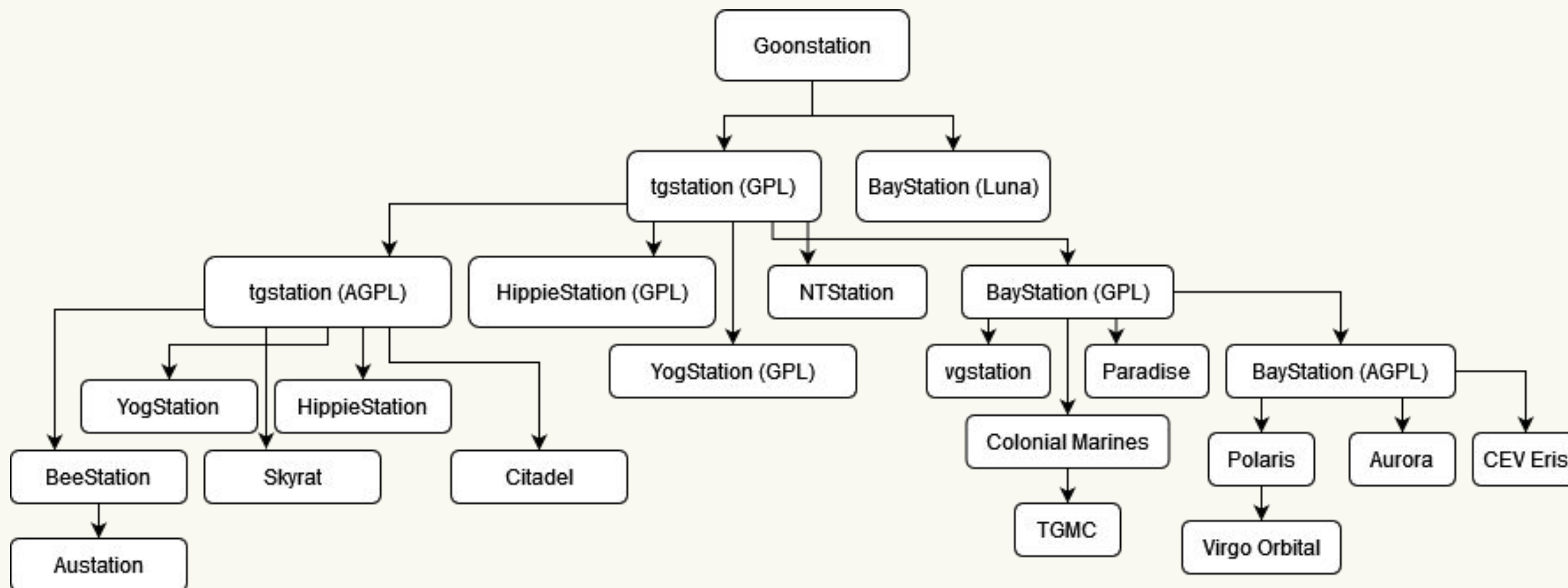
It sure did look like, something!



2006, 3 years later

- The source code changed hands a few times
- ...until it was released under CC-BY-SA

Forks! 🍴



What is Space Station 13?

It depends who you ask!

Ask a "tgstation" player...



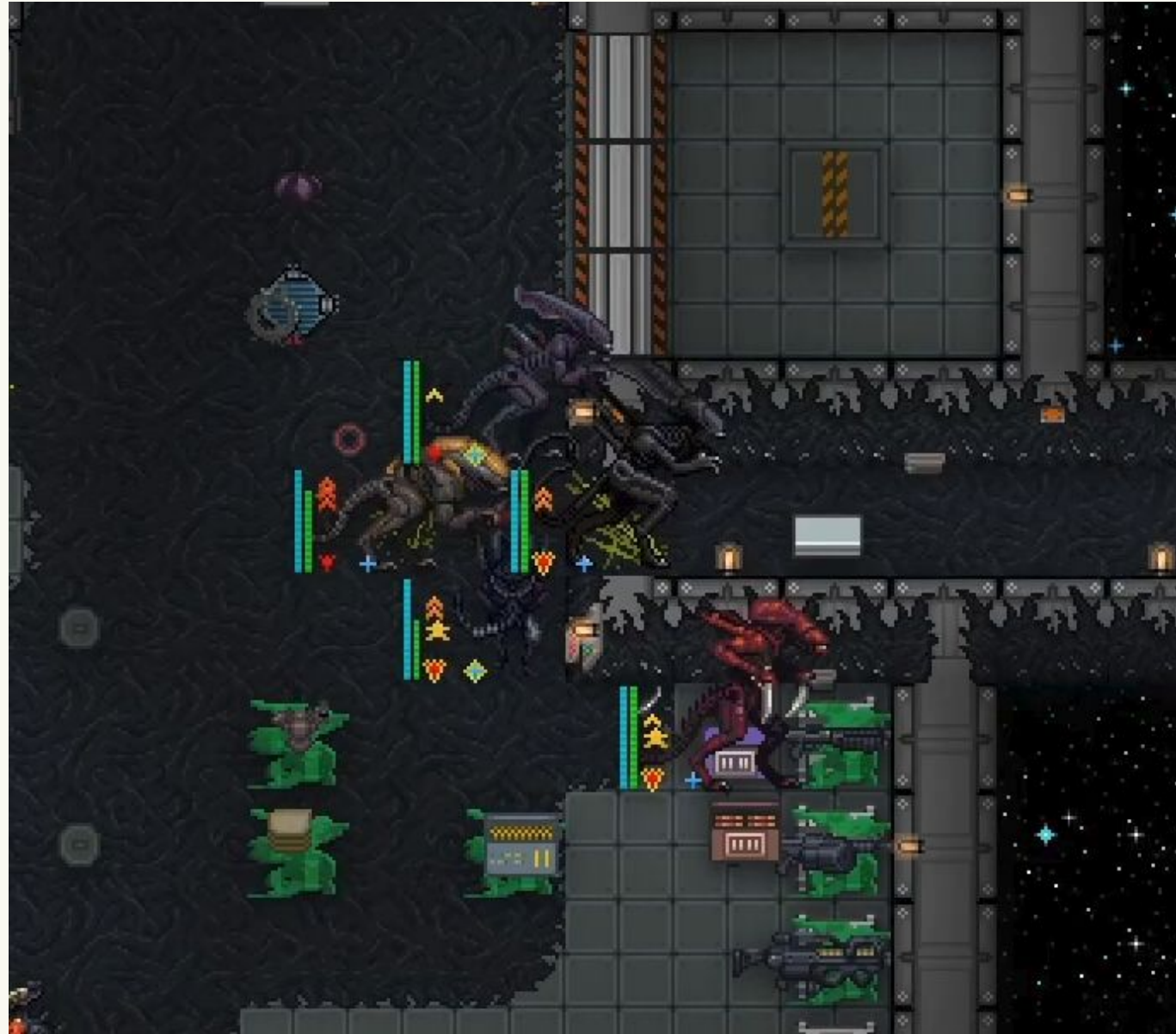
Ask a "Goonstation" player...



Ask a "Baystation" player...



Ask a "TGMC" player...



Different Communities, Different Codebases

tgstation ← That's me!

- 1,200 stars
- 3,400 forks
- 1,000 contributors
- 86,000 commits

Goonstation

- 157 stars
- 588 forks
- 184 contributors
- 14,000 commits

Baystation

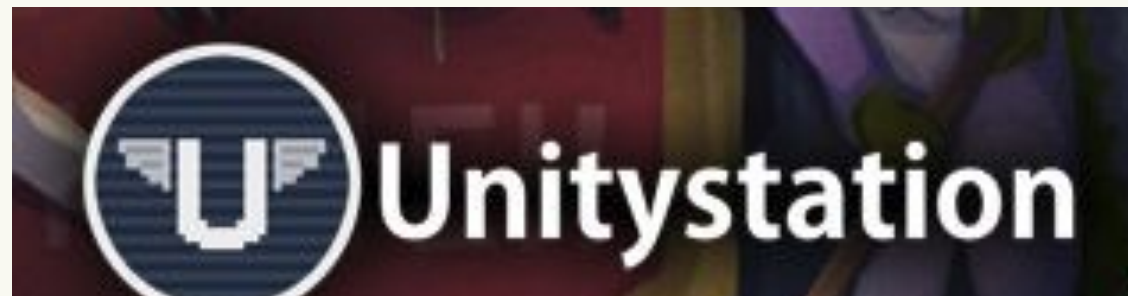
- 358 stars
- 1,400 forks
- 500 contributors
- 55,000 commits

Paradise

- 265 stars
- 870 forks
- 500 contributors
- 53,000 commits

Open Source Development With a Closed Source Engine

- BYOND is not open source, and we're locked into its proprietary programming language...
- ...though many people are trying to change that!



Watch 35

Fork 626

Star 613



Watch 38

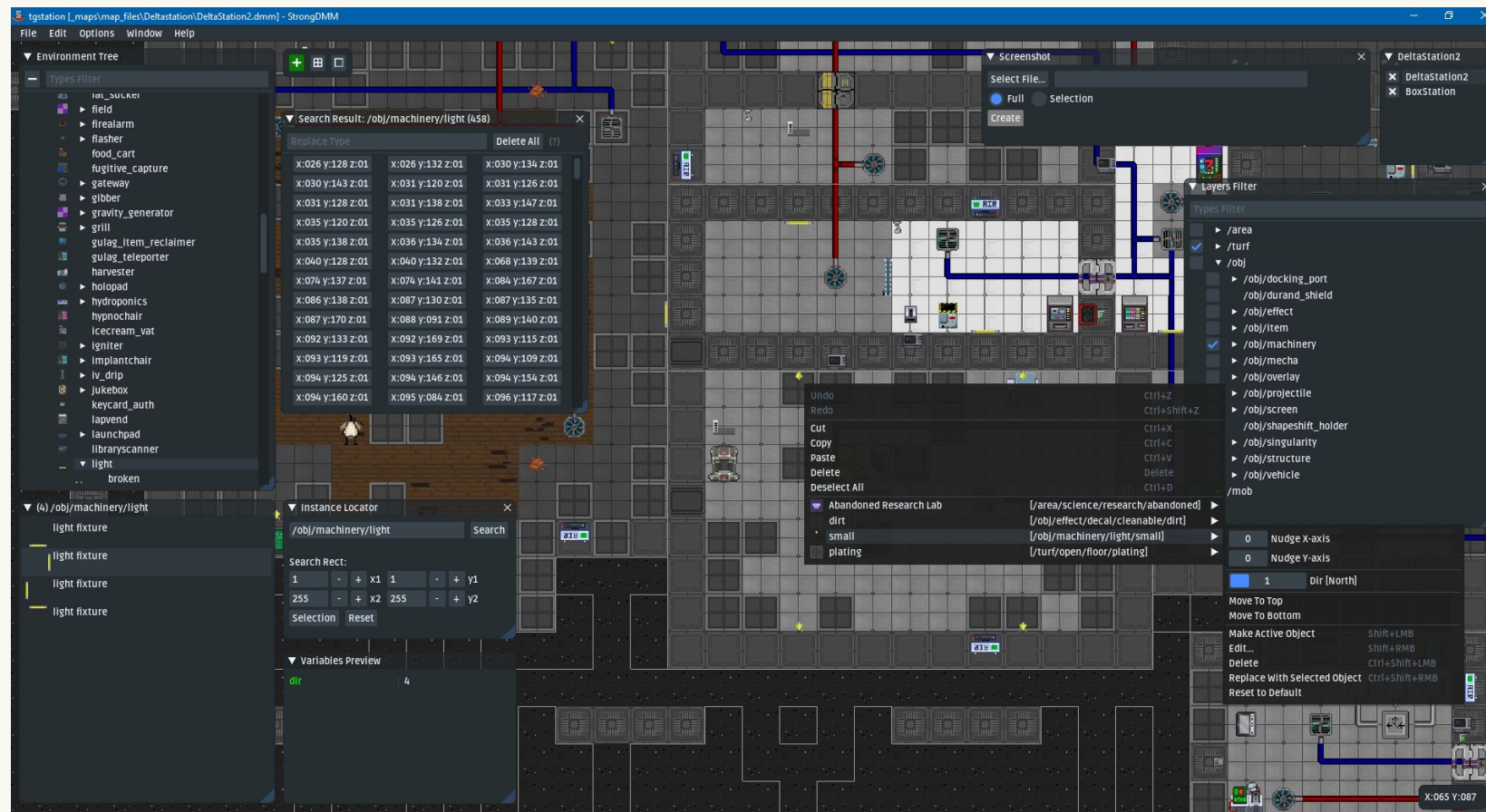
Fork 515

Star 603

Open Source Development With a Closed Source Engine

Open source tools for the engine do exist!

Crack limits of the engine!



Open source map editor!

 [willox / auxtools](#) Public

External editor support!

```
306 | user.  
307 | retur appearance  
308 | ..()  
309 | appearance_flags  
310 | /obj/item/ai_armor  
311 | ..()  
312 | if law_d assess_threat  
313 | law_d assume_air  
314 | else  
315 | law_d atmos_expose  
316 | atmos_spawn_air  
317 | atom_break  
318 | /***** atom_colours  
319 | atom_destruction  
... | atom_fix  
320 | /obj/item/ai_atom_integrity
```


tgstation's Open Source Environment

Contributions

- Anyone can make pull requests
- Fairly loose guidelines on what can be added
- Both fun stuff...

Add blowing kisses #56698

 Merged

Mothblocks merged 12 commits into `tgstation:master`

Adds 🤜 High 🤜 Fives 🤜 #54516


 Merged

Rohesie merged 5 commits into `tgstation:master` from `Ry11`


Contributions

- Anyone can make pull requests
- Fairly loose guidelines on what can be added
- Both fun stuff...and huge mechanics!


HERETICS: Solo Antagonist that grows with power #51199

 Merged nemvar merged 225 commits into `tgstation:master` from `EdgeLordExe:new-antag` on Jun 14, 2020

Tramstation: choo choo MORE MAP COMIN' THROUH

 Merged EOBGames merged 153 commits into `tgstation:master` from `MMMiracles:tramstation` on Mar 11

[READY] Replaces sleepers with stasis beds (Lifeform Stasis Unit)

 Merged ExcessiveUseOfCo... merged 19 commits into `tgstation:master` from `JJRcop:stasis_reborn` on May 7, 2019

Contributions

Tons of contributions are made every day!

Starter	Medical	Engineering	Science	Security	Antagonists	Other	Development
<ul style="list-style-type: none"> • Tutorial • The Rules • Keyboard Shortcuts • Guide to HUD Icons • Job Selection and Assignment • Terminology • Frequently Asked Questions • Guide to Avoiding Bans 	<ul style="list-style-type: none"> • Guide to Medicine • Guide to Chemistry • Guide to Ghetto Chemistry • Chemical Recipes • Guide to Plumbing • Guide to Grenade Construction • Guide to Genetics • Guide to Diseases • Guide to Surgery • Guide to Traumas • Guide to Wounds 	<ul style="list-style-type: none"> • Guide to Construction • Guide to Machine Construction • Guide to the Solars • Guide to the Singularity Engine • Guide to the Tesla Engine • Guide to the Supermatter Engine • Guide to the Gas Turbine • Guide to Power • Guide to Atmospheric • Guide to Telecommunications 	<ul style="list-style-type: none"> • Guide to Research and Development • Guide to Robotics • Guide to Toxins • Guide to Xenobiology • Guide to Telescience • Guide to Nanites • Guide to Cytology • Guide to Circuits 	<ul style="list-style-type: none"> • Space Law • Standard Operating Procedure • Guide to Trials • Guide to Security • Guide to Shitcurity (What NOT to do) 	<ul style="list-style-type: none"> • How to be a No Good Dirty Traitor • Makeshift Weapons • Guide to Hacking • Guide to Combat • Syndicate Items • Guide to Illicit Access • Guide to Revolution • Cults for the Uninitiated • Top Secret: Nuclear Operative's Field Guide • Guide to Malfunction • How to Play an Alien • Abductor guide • Families • Heretic 	<ul style="list-style-type: none"> • Guide to AI Modules • Guide to Silicon Policy • Guide to Awesome Miscellaneous Stuff • Creatures (Player controlled beings) • Critters (Game controlled beings) • Guide to Races • Guide to Food • Guide to Drinks • Guide to Hydroponics • Guide to Plants • Guide to Playing Music • Guide to Paperwork • Random Events • List of Supply Crates • Makeshift Weapons • Deep Lore • Auxiliary Base Construction • Guide to Wire Art • Guide to Space Exploration 	<ul style="list-style-type: none"> • Guide to Contributing to the Game • Setting up Git (TG13 Source Control) • Guide to working with tgstation as an upstream repository • Downloading the Source Code • Understanding SS13 Code • SS13 for Experienced Programmers • Text Formatting • Guide to Spriting • Guide to Mapping • Map Merger • Guide to Changelogs • Getting your pull accepted • Guide to Contributing to the Wiki • Reporting Issues • Starter Guide to Admin Tools

Contributions at our Scale

Commits



Week

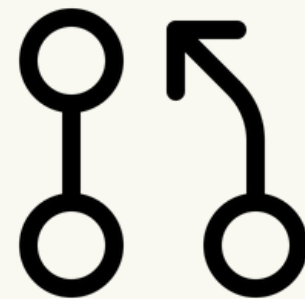
- Hundreds of commits per week
- Hundreds of **pull requests** per week
- Over a hundred unique contributors **per month**

Contributions at our Scale



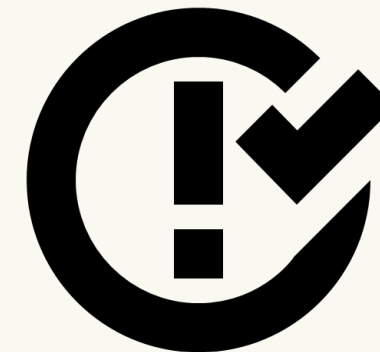
70+ members

Commit Access



~25 members

Issue Managers



~40 members

Contributions at our Scale

- Most pull requests will be closed or merged within 7 days
- We regularly interact with contributors through both GitHub and chatting platforms

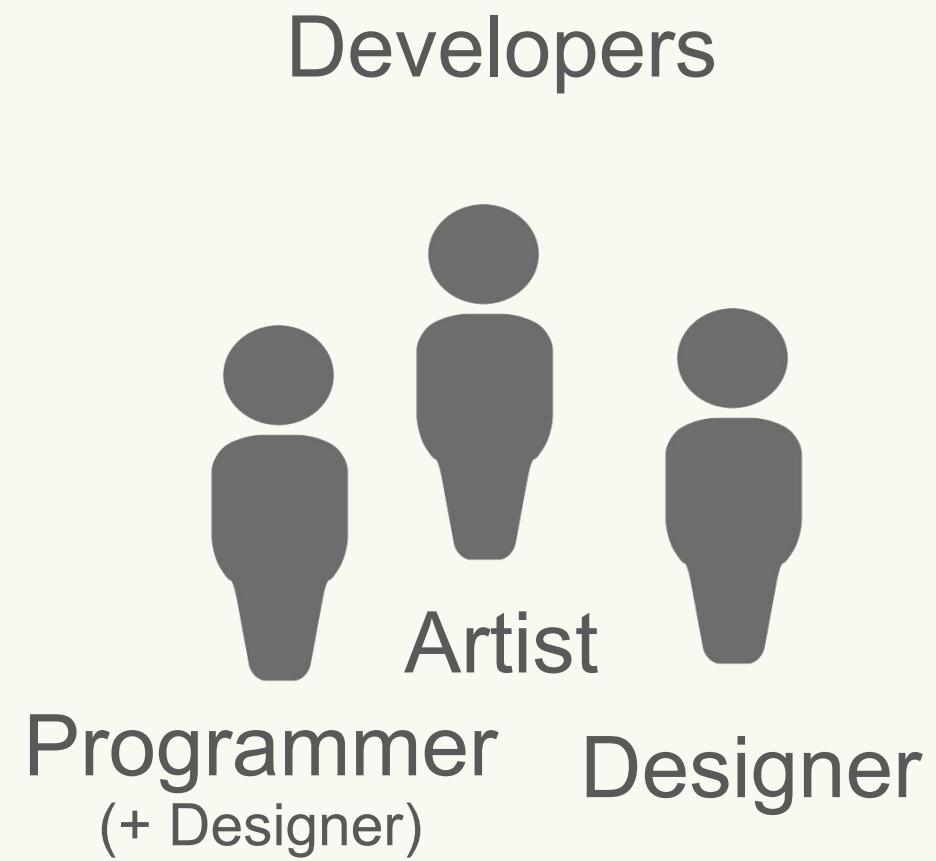
Pros of Open Source

(for us)

- Open source turns **players** into **designers**. Instead of suggesting, players are incentivized to **create**.
- Content is provided to players at an unmatched rate.
- Updates that are considered large for traditional games get merged almost daily.

Players and Open Source

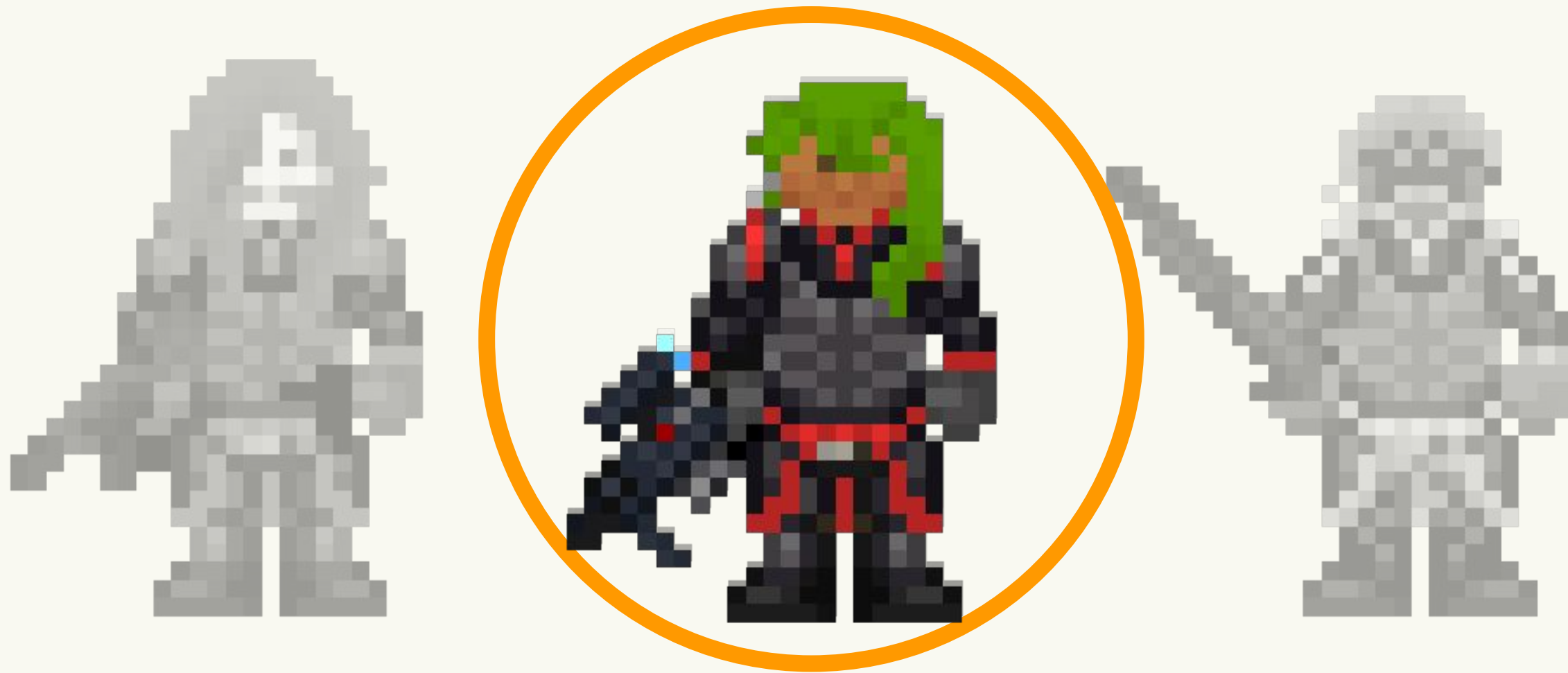
Players and Traditional Game Development



Players and Traditional Game Development



Players and Traditional Game Development



Players and Open Source Game Development

- Features usually come from players
- Maintainers review code, not so much write it
- The *ideas* for features also come from players

Players and Open Source Game Development



Players and Open Source Game Development



Players and Open Source Game Development

Chess, Sofas & Shutters - Furniture Update #53861



Players and Open Source Game Development

[Ready] Prisoner role #48819









Players and Open Source Game Development

- Players contribute what they think is fun, and they contribute a *lot*

Starter	Medical	Engineering	Science	Security	Antagonists	Other	Development
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Players and Open Source Game Development

Even if ideas are unlimited, your time is not!

	Plushie relationships! ✓	Mechanic	Review Again
#33184 by CosmicScientist was merged on Dec 2, 2017			
	adds handholding ✗	Mechanic	
#33831 by silicon was merged on Dec 27, 2017			
	Reaction rates, pH, purity and more! Brings a heavily improved, less explosive and optimised fermichem to tg. ✓	Code Improvement	Config Update
#56019 by Thalpy was merged on Feb 11, 2021 • Changes requested			
	[TMC] Baton rework ✓	Balance/Rebalance	Mechanic
#45377 by Akrilla was merged on Aug 14, 2019 ➡ Stuns and Stami...			
	Kilo Station ✓	Map Edit	Mechanic
#46968 by Okand37 was merged on Nov 13, 2019			
	[READY] Runechat: 'Runescape-like' Chat Message Overlays (It's back!) ✓	GitHub	Mechanic
#50608 by bobbahbrown was merged on Apr 25, 2020 • Changes requested 15 tasks done			

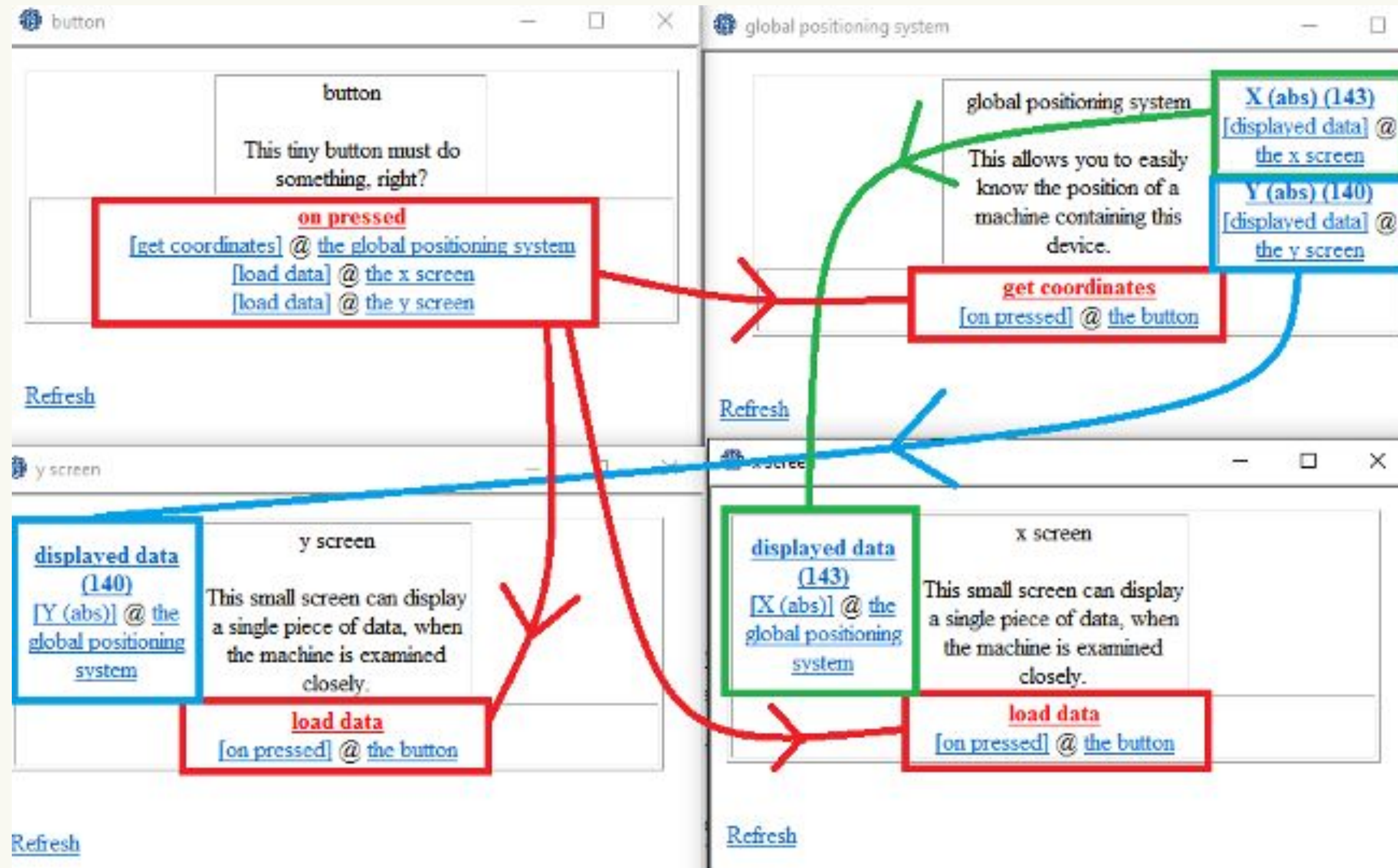
Players and Open Source Game Development

- Players add what they enjoy
- Time isn't diverted from other content, it's just more content!
- Players who contribute, more often than not, improve the game for the better

Nearsighted quirk lets you pick the look of the glasses you spawn with #62145








Case Study: Circuits



Circuits



[READY]integrated circuitry port+upgrade. #32481

 Merged ninjanomnom merged 150 commits into `tgstation:master` from `arsserpentarium:master` on Nov 14, 2017

 Conversation 504  Commits 150  Checks 0  Files changed 62



arsserpentarium commented on Nov 6, 2017 • edited

Contributor  

Ahem. After 3 weeks of work I can proudly present you port and upgrade of modular machinery(circuitry) from polaris. I have upgraded it a bit with several components, which can make it actually useful. With this feature you can make smart turrets, full analog of farmbot(fully custom, made from circuits), drone-officiant,drone-guard, things for spying and huge variety of different things.It's cliché, but you are limited mostly by your imagination and round duration.
Changelog.

Special thanks for :

Jammer 312 for help.And sorry for my pestering.

ImGoofball for help with subsystems and other issues.

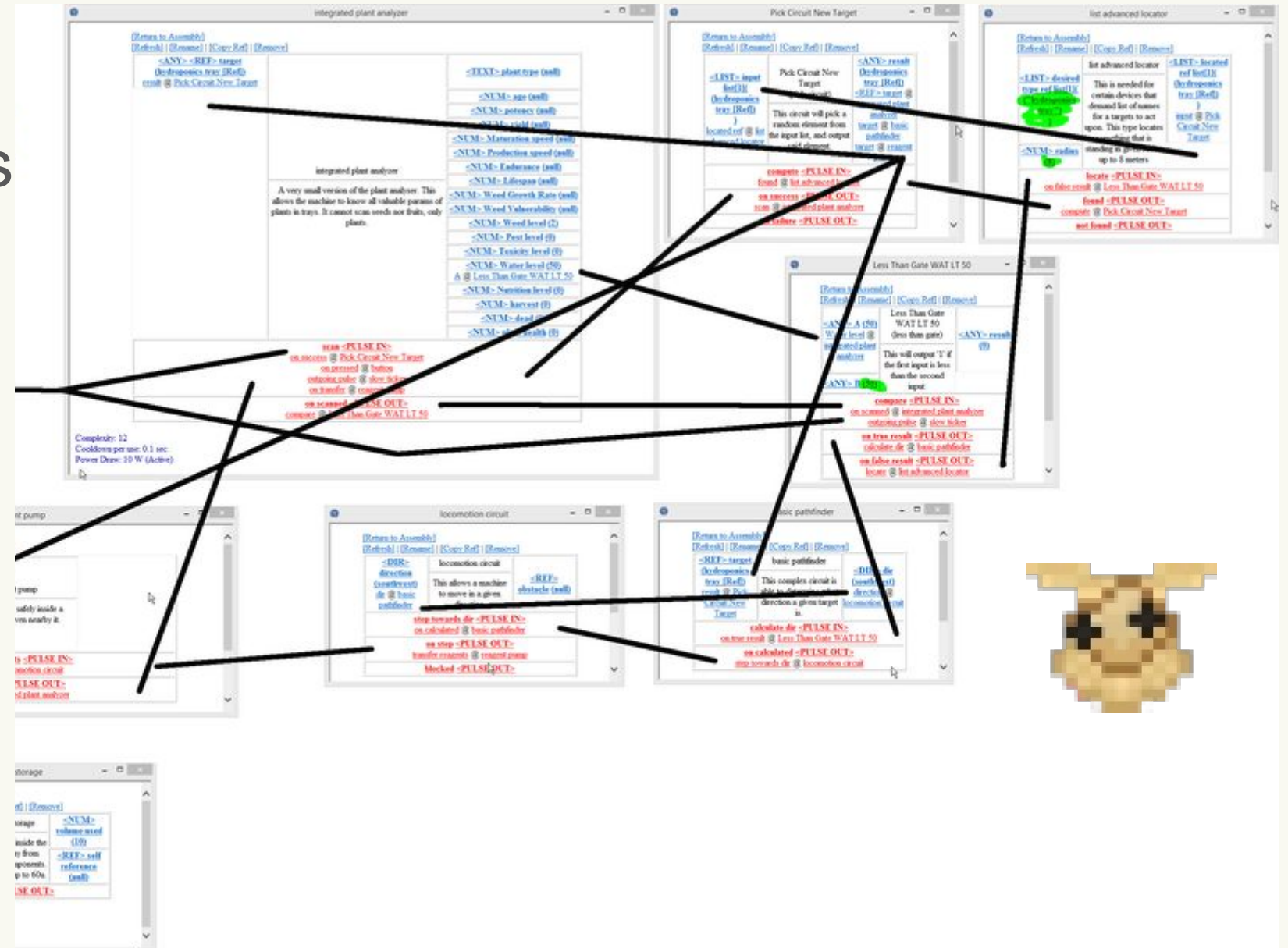
Kevinz000 for help with improvement of code

GUN_HOG for testing and feedback.















Maintainers for fast work and proposals,how to fix issues.

Circuits

- Circuits make very good weapons
- Circuits can be saved across rounds
- Circuits can be easily hidden away
- Circuits are really hard to make





Circuits


 Fixes wrong circuits ✓ Fix
#37853 by DaxDupont was merged on May 16, 2018
 Circuit gun inhands and grabber fix ✓ Fix Mechanic Sprites
#37836 by Garen7 was merged on May 17, 2018
 Some circuitry fixes and qol ✓ Fix Mechanic
#37755 by Garen7 was merged on May 23, 2018 • Changes requested
 Improves descriptions of Integrated Circuits ✓ Grammar and Formatting
#37678 by Alexch2 was merged on May 19, 2018 • Changes requested
 Prevents electric grills from mass producing lightning through exploits ✓ Fix
#37676 by Garen7 was merged on May 6, 2018
 Circuit Labels (sorta understanding git edition) ✓ Mechanic
#37633 by r-esistor was merged on May 21, 2018 • Approved
 You can no longer print infinite ammunition. ✓ Balance/Rebalance
#37626 by DaxDupont was merged on May 3, 2018 • Approved
 Integrated Circuits: String parsing update ✓ Mechanic
#37571 by PKPenguin321 was merged on May 8, 2018
 Circuit Labels ✗ Good First PR Mechanic
#37519 by r-esistor was closed on May 2, 2018 • Changes requested
 Circuits can't throw themselves ✓ Fix
#37510 by JJRcop was merged on Apr 30, 2018 • Approved
 IC weapon mechanism only works when assembly is on turf ✓ Balance/Rebalance
#37496 by evsey9 was merged on Apr 29, 2018
 Removes damage from thrower circuits ✓ Removal
#37495 by lamgoofball was closed on Apr 30, 2018
 Thrower Removal ✓ Removal
#37490 by BlueNothing was closed on Apr 27, 2018
 Thrower Nerf ✓
#37488 by BlueNothing was closed on Apr 27, 2018 • Changes requested


Non-exhaustive list of circuit changes


[READY]Removal of circuits #41108


 Merged Cyberboss merged 66 commits into `tgstation:master` from `Shdorsh:patch-27`

 Conversation 61

 Commits 66



 Checks 2

 Files changed 58



Shdorsh commented on Oct 23, 2018 • edited

[Changelogs]: # Removes the entirety of circuits.

 Shdorsh
del: Circuitry module
/

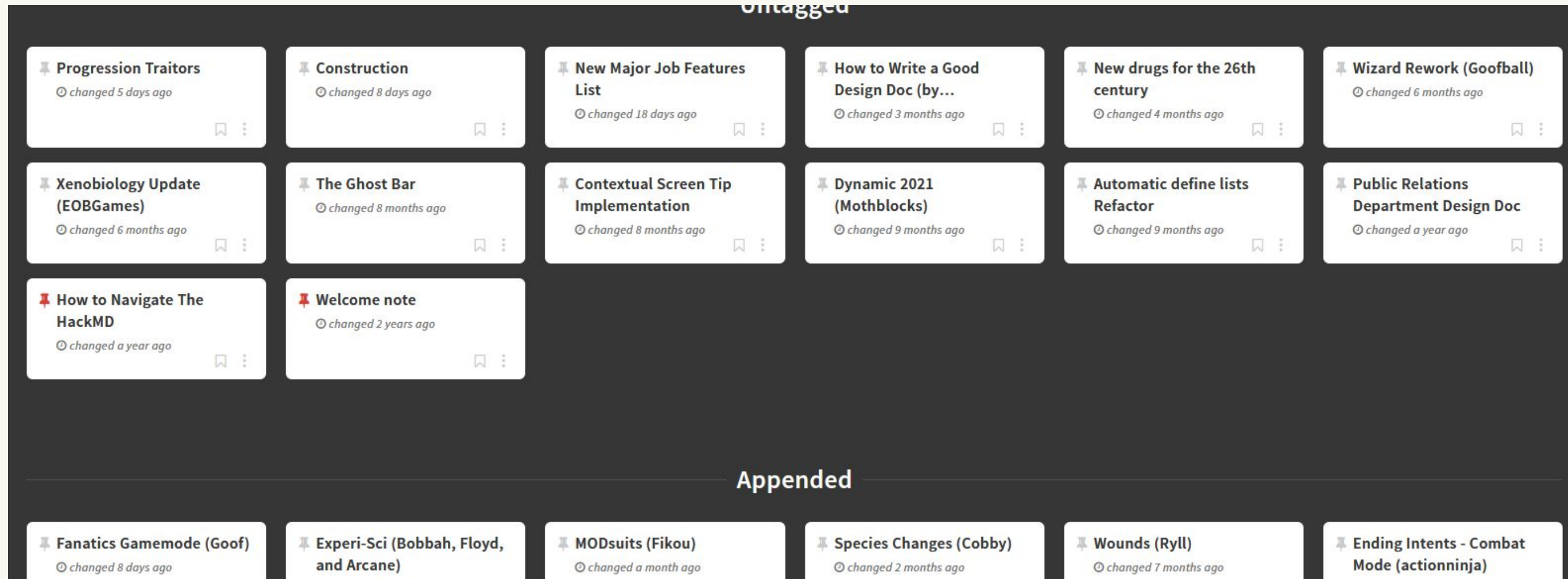
What went wrong?

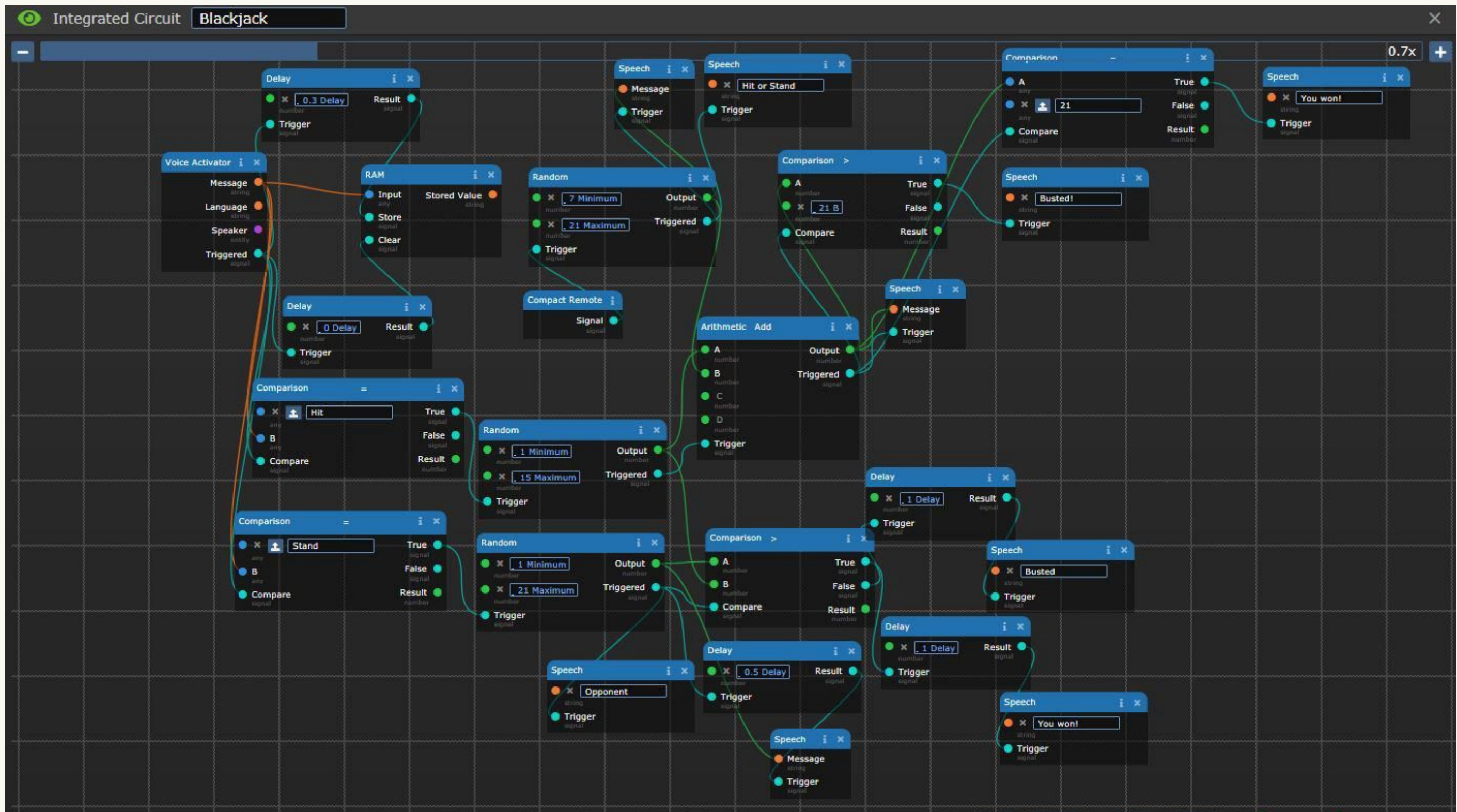
Inconsistent Design Vision

- Lots of contributors, but very few chances to onboard
- Large features are often made without a clear understanding of the rest of the game
- Huge PRs don't often get denied, even if they should be

Inconsistent Design Vision

- Maintainers are easy to access for design consulting
- Players are encouraged to write design docs, which are then posted publicly





Circuits: Take 2

Circuits: Take 2

Design docs aren't *required*, but of course help

Integrated Circuits - /tg/ edition (Mothblocks)

Abstract

Integrated Circuits (henceforth known as circuits) are a Wiremod-like system to allow for creative players to interact with the world through the use of custom built automated machinery. The machines are limited by time to create, evaluation time, and power consumption. Players are encouraged to spend time experimenting with imaginative designs, while also needing to optimize their works.

Goals

1. Avoid “cook booking”, and encourage creativity. While useful circuit designs will make their way around, players should feel inspired to create designs of their own, and feel like it is easy to do so.
2. Be deep, not needlessly complex. The mechanics should be easy to pick up, and the UI should be easy to use. The challenge should come from optimization (power usage, evaluation time) and from thinking through the logistics of a design, the same challenges that come through traditional engineering.
3. Aim to provide general functionality. Components that are too specific will feel like they constrict design.
4. Assemblies that interact with the world must be in shells that cannot be picked up (oranges requirement).

Non-goals

Circuits: Take 2











- Someone else picked up the code



- This happens a lot!

Circuits: Take 2

Contributions!

 Fixes loading shells with their own initial circuits ✓ Administration
#63628 by Y0SH1M4S73R was merged 15 days ago • Approved
 Optimizes the <code>output_part_info()</code> proc in Mech Fabricators. ✓ Good First PR Refactor
#63379 by Zonespace27 was merged 15 days ago
 BCI implanters no longer drop their BCI on the floor when opened ✓ Fix
#63204 by Y0SH1M4S73R was merged on Dec 5, 2021 • Approved
 adds health column to crew monitor usb component ✓ Content Expansion Stale
#63086 by FA120 was merged on Dec 7, 2021
 Make USB cables attached to locked circuits unable to be modified ✓ Fix
#63084 by RandomGamer123 was merged on Dec 5, 2021 • Changes requested
 Allows shells that requiring anchoring to take power from APCs ✓ Content Expansion
#62907 by Watermelon914 was merged on Nov 19, 2021 • Changes requested
 Synthesizers and headphones can now have circuits! ✓ Content Expansion
#62825 by Ghommie was merged on Dec 1, 2021
 Instant cameras can now be used as circuit shells. ✓ Content Expansion
#62810 by Ghommie was merged on Nov 23, 2021
 Reagents scanner circuit component ✓ Content Expansion
#62704 by Ghommie was merged on Nov 10, 2021 • Approved
 Hydroponics Tray USB Port (plus a tiny refactor needed to fit it in) ✓ Content Expansion Refactor
#62652 by Ghommie was merged on Nov 15, 2021 • Approved

...but we're not without our downsides

"Feature Coders"

- Some people contribute features, but don't maintain them



PR balances!

PR Balances

- Contributors have a score
- Gain points for maintaining the codebase
- Spend points for adding more maintenance

PR Balances



0 points



-10 points

PR Balances



-10 points



github-actions bot commented on May 21, 2021

Contributor

You currently have a negative Fix/Feature pull request delta of -10. Maintainers may close this PR at will. Fixing issues or improving the codebase will improve this score.

PR Balances



-10 points



0 points

<https://github.com/tgstation/gbp-action>

No Secrets

- Damage numbers, spawn chances, etc are all in plain view to see

Nanotransen Legal Liability Initiative - Weapon Stats but more RP

Merged Mothblocks merged 28 commits into `tgstation:master` from `SpaceDragon00:wepdescripts` on May 23, 2021

- Optimal strategies are regularly calculated before their pull request is even merged

No Secrets



- No mysterious design
 - People even code-dive our for fun one time events :(

No Secrets

You don't feel very well.



```
215
216 /datum/disease/transformation/slime
217     name = "Advanced Mutation Transformation"
218     cure_text = "frost oil"
219     cures = list(/datum/reagent/consumable/frostoil)
220     cure_chance = 55
221     agent = "Advanced Mutation Toxin"
222     desc = "This highly concentrated extract converts anything
223     severity = DISEASE_SEVERITY_BIOHAZARD
224     visibility_flags = NONE
... 225     stage1 = list("You don't feel very well.")
226     stage2 = list("Your skin feels a little slimy.")
```


No Secrets

While we can't create mysterious expansions...our wiki is frequently updated and ruthlessly detailed.

All of this is automated through code!

<div>Salicylic Acid</div> <div>Impurity: Chemical</div> <div>Isomers</div> <div>Failed: Viscous sludge</div> <div><15%</div> <div>pH: 2.1</div>	<div>1 part Phenol</div> <div><div>1 part Oil</div><div><div>1 part Welding Fuel</div><div>1 part Carbon</div><div>1 part Hydrogen</div></div></div> <div>1 part Chlorine</div> <div>1 part Water</div> <div>1 part Sodium</div> <div>1 part Carbon</div> <div>1 part Oxygen</div> <div>1 part Sulphuric Acid</div>	<div>Min react temp: 100K</div> <div>Overheat temp: 900K</div> <div>Optimal pH range: 5 to 10</div> <div>Min purity: 0.25</div> <div>Mildly exothermic</div> <div>Mildly H+ consuming</div>	Brute	If you have more than 25 brute damage, heals 4 brute. If you have equal to or less than 25 brute damage, heals 0.5. Overdosing will deal more brute damage.	0.2 units per tick	25 Units
<div>Oxandrolone</div> <div>Impurity: Chemical</div> <div>Isomers</div> <div>Failed: Viscous sludge</div> <div><15%</div>	<div>3 parts Carbon</div> <div>1 part Phenol</div> <div><div>1 part Oil</div><div><div>1 part Welding Fuel</div><div>1 part Carbon</div><div>1 part Hydrogen</div></div></div> <div>1 part Chlorine</div> <div>1 part Water</div>	<div>Min react temp: 100K</div> <div>Overheat temp: 900K</div> <div>Optimal pH range: 5 to 10</div> <div>Min purity: 0.25</div> <div>Mildly exothermic</div>	Burn	If you have more than 25 burn damage, heals 4 burn. If you have equal to or less than 25 burn damage, heals 0.5. Overdosing will deal more burn damage.	0.2 units per tick	25 Units

Every Change Has A Username

Controversial Changes in Open Source Games

Controversial Changes in Traditional Game Development

Developers

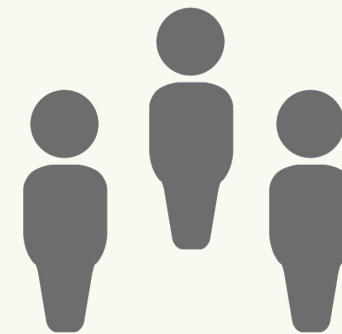


Studio



"Toolbox Games"

Players



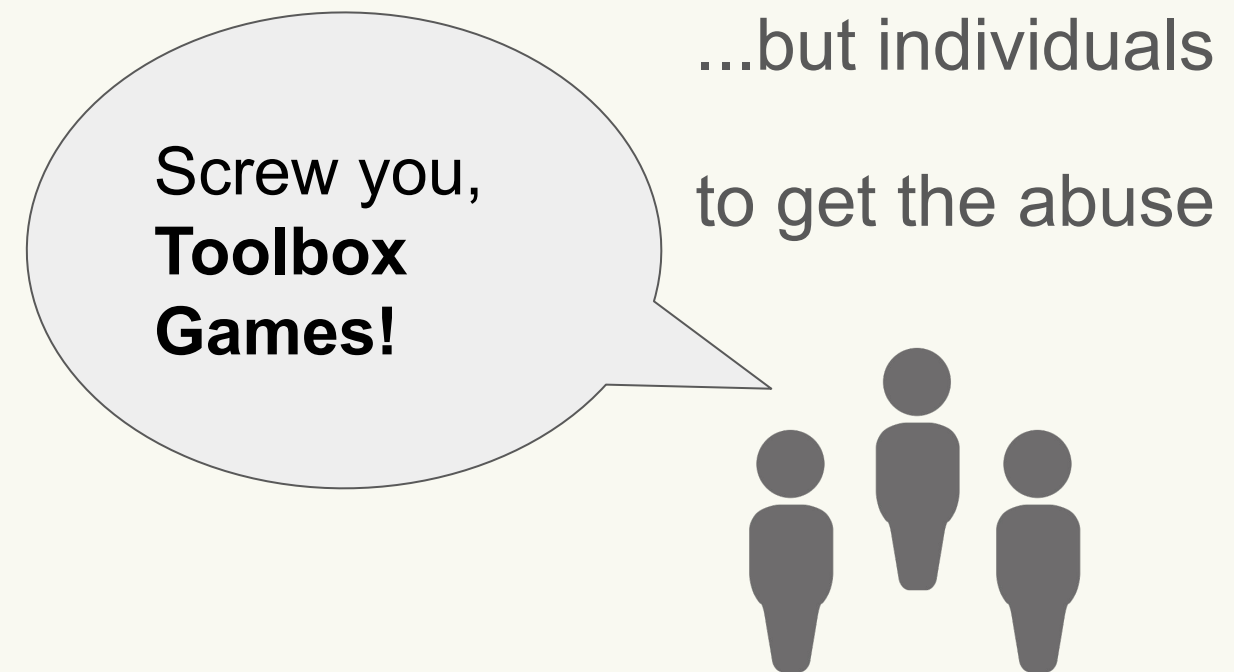
Controversial Changes in Traditional Game Development

- Developers make controversial change...



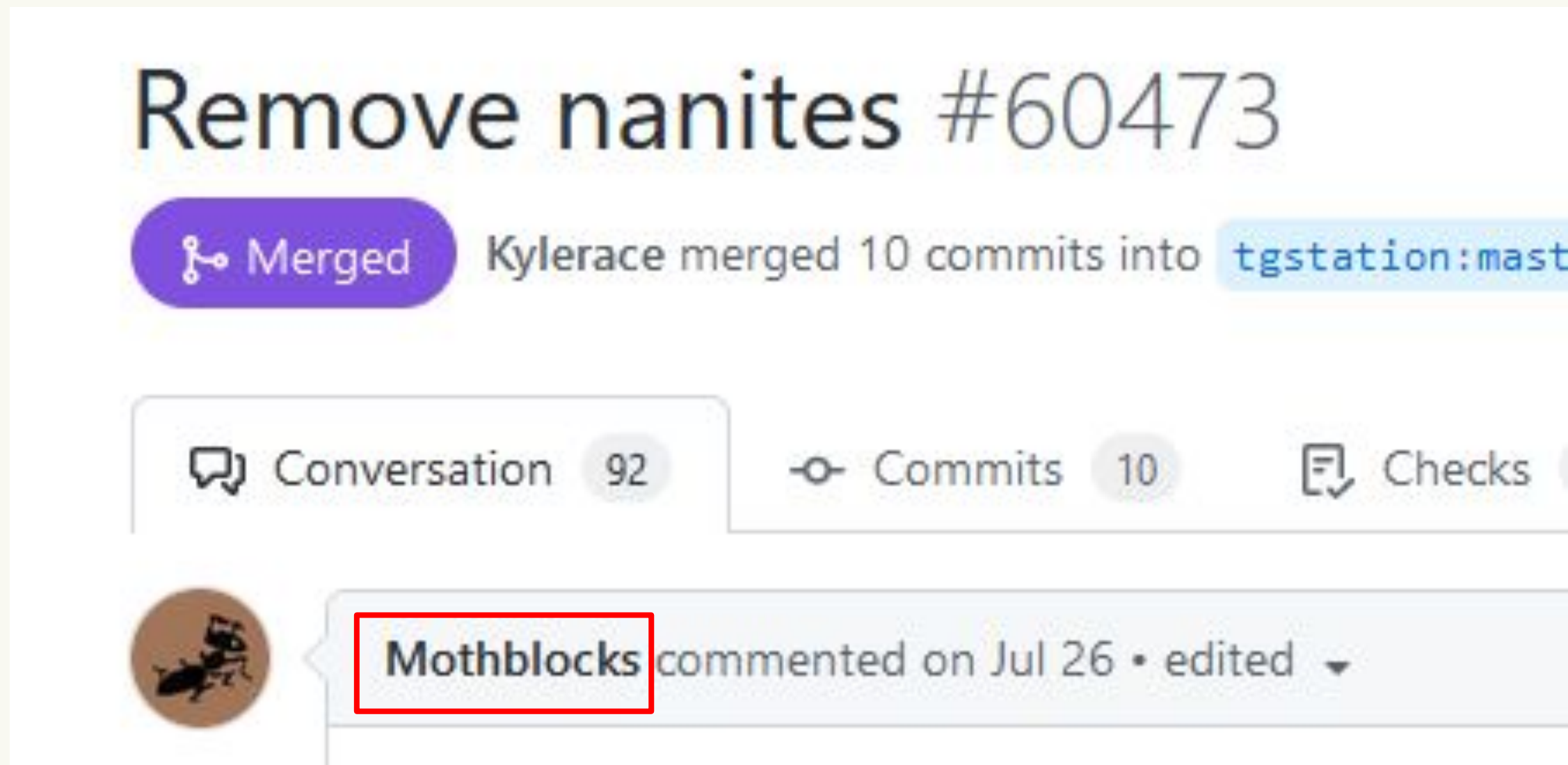
Controversial Changes in Traditional Game Development

- Developers make controversial change...



...but with open pull requests...

Controversial Changes in Open Source Games



...the author is center stage...

Controversial Changes in Open Source Games

...and abuse is much more directed

```
(DEAD) "mothblocks a [REDACTED]"  
(DEAD) "[REDACTED] you mothblocks"  
(DEAD) "mothblocks be removing tons of [REDACTED]"
```

```
"Mothblocks took out Nanites so he could fit his Personal Project into the game."
```



```
"because the coders _mothblocks_ in particular"
```

```
"Mothblocks is the Betrayer"
```


Controversial Changes in Open Source Games

- Lead maintainers try to take the role of public relations
 - Blame shifts for controversial changes in order to protect contributors
- GitHub moderation lets us ban toxic individuals, though they still have access to all sorts of other platforms.
- Be nice to your open source maintainers, please!

Conclusion

- While open source game development is not perfect...
- Open source turns players into creators
 - Changes, both large and small, are made extremely frequently
- Open source lets communities create their own derivatives
 - A large amount of active SS13 forks are still maintained by large communities
- We are very happy with our decision to continue maintaining SS13 as an open source game!

GDC

March 21-25, 2022
San Francisco, CA

Thank you!

#GDC22

