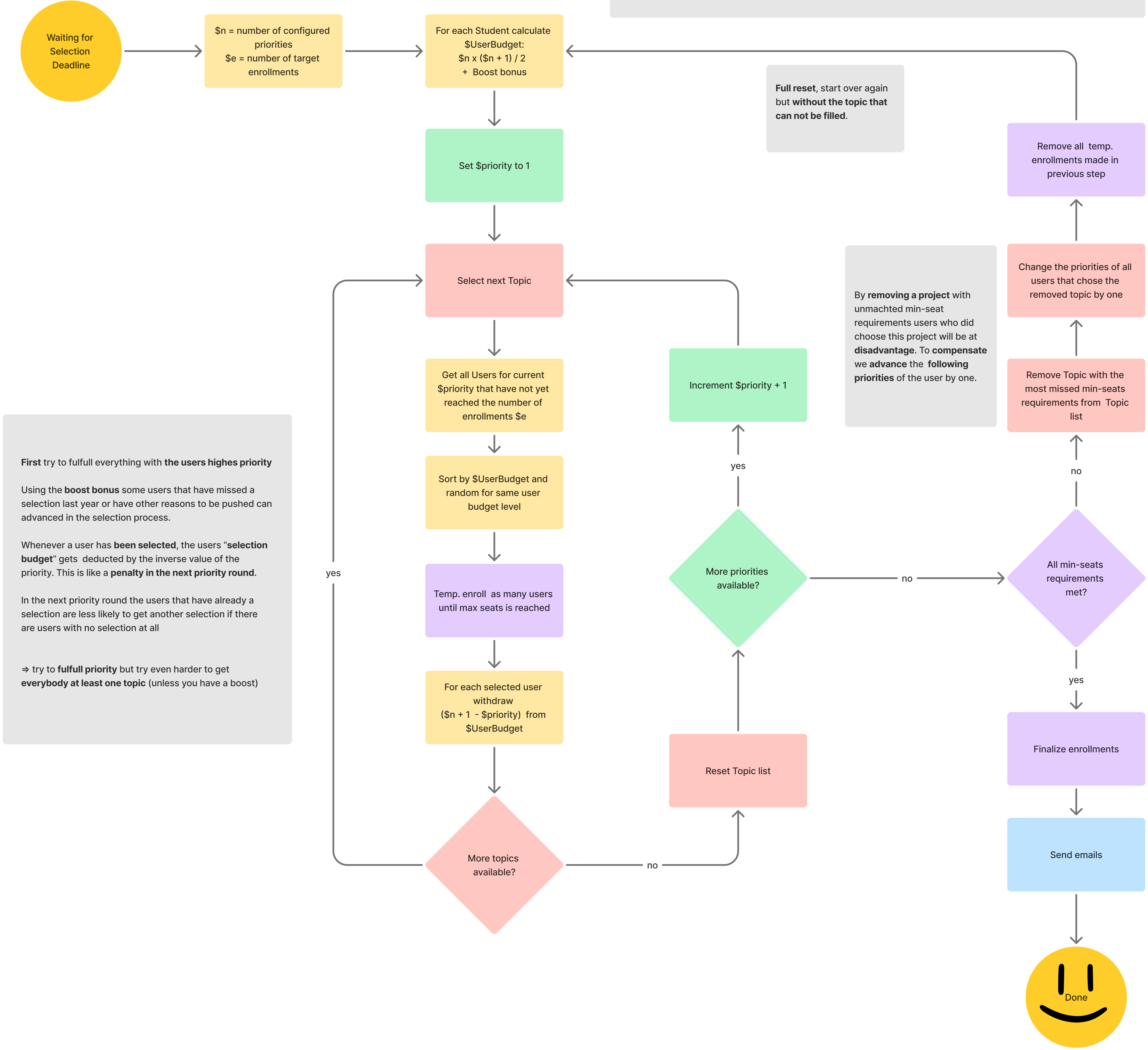
Project Broker Matching Algorithm

High-Level Concept

- For all priority levels starting at level 1 do:
  - Loop over all topics
    - Match as many user with the current priority but not more as the max-seat requirement
      - Sort users with the current priority by their priority budget
      - Randomize users in the same priority budget bucket
      - Deduct the priority budget by the inverse priority level (Level 1 ⇒ -9) for successfully enrolled users

- Check all topics for missed min-seat requirements
  - Remove topics with missed min-seat requirements from list
  - Clear all enrollments
  - Reset all priority budgets
  - Restart enrollment process
- Optional: check if all users have their seats and if all topics are fully filled
  - If not, do x extra leaps and optimize for better placement
  - NP complete problem, can not compute all variations! (all variations of #stud, #prios, #topics, min/max restrictions)



Waiting for Selection Deadline

$n = number of configured priorities
$e = number of target enrollments

For each Student calculate $UserBudget:
$n x ($n + 1) / 2
+ Boost bonus

Set $priority to 1

Select next Topic

Get all Users for current $priority that have not yet reached the number of enrollments $e

Sort by $UserBudget and random for same user budget level

Temp. enroll as many users until max seats is reached

For each selected user withdraw
($n + 1 - $priority) from $UserBudget

More topics available?

yes

no

Reset Topic list

More priorities available?

yes

Increment $priority + 1

no

All min-seats requirements met?

no

Remove Topic with the most missed min-seats requirements from Topic list

Change the priorities of all users that chose the removed topic by one

Remove all temp. enrollments made in previous step

Full reset, start over again but **without the topic that can not be filled.**

By **removing a project** with unmachted min-seat requirements users who did choose this project will be at **disadvantage**. To **compensate** we **advance** the **following priorities** of the user by one.

yes

Finalize enrollments

Send emails

Done

First try to fulfull everything with **the users highes priority**

Using the **boost bonus** some users that have missed a selection last year or have other reasons to be pushed can advanced in the selection process.

Whenever a user has **been selected**, the users "**selection budget**" gets deducted by the inverse value of the priority. This is like a **penalty in the next priority round**.

In the next priority round the users that have already a selection are less likely to get another selection if there are users with no selection at all

⇒ try to **fulfull priority** but try even harder to get **everybody at least one topic** (unless you have a boost)