AI FORA

Spain Game Specification

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| **Document History** | |  |  |
| **Version** | **Date** | **Author** |  |
| 1.0 | 1/3/2023 | Martha Bicket | Initial |
| 1.1 | 13/4/2023 | Martha | Updated to reflect ABM tweaks |
| 1.2 |  | To do | **To be updated** with the following changes as a result of our 13 April meeting with Albert and JGU:  1. [GAME & ABM] (a) Keep the agents’ desks as having varying numbers of applicants assigned to them (i.e. don’t even out the numbers assigned to each desk after all) and (b) change the way the budget works (rather than applicants receiving budget from a global pot, the budget is shared across agents’ desks unevenly and allocated by desk until each budget runs out). Together these two changes were thought to more accurately capture unfairness across different municipalities (with some areas getting more budget but having fewer or less critically-in-need applicants) and which Albert is interested in getting participants’ reflections on.  2. [ABM only (this will happen naturally in the live game)] Introduce ‘bias’ affecting how the agents assess different applicants; a given agent may place a higher weighting on one particular category compared to another (e.g. to represent that they consider physical health to be more important or deserving of funding than mental health).  3. [GAME & ABM] Separate the critical need score from the need score. Then not being seen increases the critical need score by +1. Introduce the possibility that sometimes receiving budget doesn’t improve the applicant’s situation (and if this is the case, increase the critical need score by +2). Reason: this goes some way towards capturing the issue that receiving support may not necessarily help (may not be enough or the right type of support) but it still reduces the available social service budget. For the same reason, keep the current ABM rule that if an applicant received support it improves one of their needs-categories at random (rather than improving their worst need). |
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# Types of entities

## Agents

The central characters in the game are social service agents working in a municipality who are seeking to allocate (limited) social service resources to deserving applicants, many of whom have multiple, complex needs.

The agents’ aim is to identify and allocate social service resources to applicants in order to maximise applicants’ wellbeing (by minimising the sum of their needs scores).

N.B. In live gameplay, players will take the role of the **social service agents**. However, the ABM interface is currently set up to visualise the **applicants’** positions and progress (where the applicants are the individuals hoping to be seen and allocated budget by the agents).

## Resources

Quantities and features that are available in the environment for ABM agents to obtain or use:

* Social service budget (measured in money units) (the budget is refreshed each round unless there are any critically needy applicants in which case a penalty deduction is made for each one).
* Available appointments (the number of applicants that agents can see each round)
* [social service agents] Applicant information (see below)

## Other objects

### Applicant locations (as shown in the ABM interface)

* Applicant home (end of round)
* Agent 1’s desk
* Agent 2’s desk
* …
* Agent N’s desk

### Agent locations (for live gameplay)

* Agent home (end of round)
* Social service desk (equivalent of work)
* Office meeting (equivalent of town hall) – where they can see the scoring algorithm and vote to change it and/or other elements of the game (e.g. assessment process and resource allocation).

# Attributes

## Applicant attributes

Dynamic

* Overall need score (highest scoring individual is deemed by the algorithm to be the most in need)
* Household income
* Accommodation\*
* Work and training\*
* Mental health\*
* Physical health\*

Fixed

* Number of dependents

\* These attributes correspond directly to those in the SSM-CAT self-sufficiency matrix (2020\_07\_08\_sistemes informació SSM-CAT en-GB.pdf)

## Global attributes

* Number of applicants
* Number of agents
* Round number, starting with zero
* Social services budget
* Available appointments (the number of applicants that agents can see each round)
* Threshold (the threshold above which applicants are considered critically-in-need (currently 6 x 3 = minimally self-sufficient across all six categories). If applicants' need scores are above this threshold then the next round's budget suffers a penalty reduction).

# Gameplay

* Agents can see a limited number of applicants per round (applicants are randomly allocated appointments with agents in order at the beginning of the round).
* Agents review and score applicants based on the scoring ruleset and applicants’ attributes (see current scoring algorithm below).
* At the end of the round the social service budget is distributed to successful applicants in order of severity (highest scoring applicant gets full payment etc. then second highest applicant etc. until budget for that round is used up). For each successful applicant, the round’s budget is depleted by the same amount as their need score.
* At the end of each round, applicants’ needs are updated depending on their existing needs and whether they received support or not.
  + If an applicant received support it improves one of their needs-categories at random.
  + If they didn’t receive anything their situation may further deteriorate.
  + An applicant may then experience a random change in fortunes before the next round. Currently there is a 20% chance of an applicant’s needs category randomly changing at the end of the round: there is a 10% chance one of their categories will worsen and a 10% chance that one of them will improve.
* When critically needy applicants’ needs aren’t met in a given round, this impacts the upcoming round’s available budget (the assumption is that these applicants will end up drawing on social services elsewhere in the system). This does not improve the applicant’s needs score.
* The game ends if there is no budget left at the beginning of a round to allocate to any of the applicants.

## Scoring algorithm used by agents to assess applicants

Currently implemented:

* For all attributes except *household income* and *number of dependents*: 1 ‘need point’ is allocated according to which category the applicant’s current situation falls into, e.g.:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Need points** | 5 | 4 | 3 | 2 | 1 |
| **Applicant’s situation** | Serious problems | Not self-sufficient | Minimally self-sufficient | Sufficiently self-sufficient | Completely self-sufficient |

(from “2020\_07\_08\_sistemes informació SSM-CAT en-GB.pdf)

* For *household income* and *number of dependents*, applicants are ranked against each other and given between 1 and 5 needs points based on their position relative to other applicants that round.

# Agent-agent interactions

Agents do not interact directly except at the office meeting (and only in live gameplay; this is not currently implemented in the ABM). There they can deliberate about what they consider to be the best criteria to use to allocate social services budget to applicants, and may propose regulations. To take effect, a regulation must be approved by a majority of all agents. If a new regulation is proposed, a vote about whether it should be implemented is taken at the end of the round. If passed, the new regulation is implemented for the next round.

## Some voting option suggestions:

* apply a new rule to the order in which applicants are seen by agents in each round
* change the scoring algorithm
* change how the budget is allocated to successful applicants at the end of each round

Other possibilities

* Players may want to vote for more information or transparency
* Change the parameters
  + Increase the budget
  + Change the number of available appointments