

## Contents

CHC Description .....	1
CHC Data Records .....	3
Example 1 .....	3
Example 2 .....	4
Example 3 .....	4
Example 4 .....	4
Example 5 .....	4
CHC Configurations .....	4
Configuration 1 .....	4
Configuration 2 .....	4
Configuration 3 .....	5
CHC Results and Evaluation .....	5
Results-Example 1 .....	5
Results-Example 2 .....	6
Results-Example 3 .....	7
Results-Example 4 .....	7
Results-Example 5 .....	9

## CHC Description

*Context.* Refugees and asylum seekers (TCNs) in Greece need to leave their accommodation (the one that exist via specific programs) when they have the refugee status. Due to the high number of TCNs, it is a challenging task for PRAKSIS to provide help to all TCNs for finding new accommodation facilities. Therefore, they are informed about specific programs that exist, however, due to limitations in the capacity, there is also a high number of them searching for apartments in order to share with other refugees so that to jointly afford related costs.

*Rationale.* This, in turn, requires coordination support of TCNs to find candidates with whom they could share some flat based on most similar preferences.

*MyWELCOME contribution.* In WELCOME, the co-habitation coordination (CHC) scenario is concerned with helping TCNs to form groups of candidates for sharing an apartment according to their given individual and group constraints. The agents, however, neither search for available (rentable space in) rental apartments, nor do they match groups of TCNs with landlords of apartments for rent. These activities may be performed by the

proposed groups of TCNs who best match with each other according to their individual preferences and some general hard (group) constraints of sharing some rental apartment in Greece. During self-coordination, TCNs may be assigned to more than one group of candidates for apartment sharing. In the CHC scenario, we consider the following family types: Single man; Single woman; 2-member Nuclear family; 3-member Nuclear family; 4-member Nuclear family; Single-parent (mother) family; Single-parent (father) family; Extended family.

At the end of a CHC process, each participating TCN shall be informed by his/ her agent about the recommended (approximately) optimal cohabitation group for her and the respective contact addresses of the other group members. The WELCOME system should make suggestions to the TCNs for their grouping with respect to co-habitation based on the following constraints:

**(A) Individual constraints** specified by the TCNs (preferences)

1. **Age:** A TCN could prefer to belong to a group of certain age group(s), to the extent possible, as they are more likely to share common interests. Recommended age groups for exclusive preference settings by TCNs: *18 – 25, 26 – 33, 34 – 43, 44 – 50, 50 – 65, and 65+.* **Selectable Options:** {"Don't mind", 18-25, 26-33, 34-43, 44-50, 51-65, 65-120}
2. **Gender:** A TCN could prefer being member of *Male, Female* or *Other* gender group. **Selectable Options:** {"Don't mind", "Male", "Female", "Other"}
3. **Family:** A TCN could prefer to belong to a cohabitation group certain family type(s). Recommended family types for exclusive preference settings by TCNs: *Single Man, Single Woman, Nuclear Family (a couple and their children) , Single Parent Mother Family, Single Parent Father Family, Extended family (nuclear + grandparents/other relatives).* **Selectable Options:** {"Don't mind", "Single Man", "Single Woman", "Nuclear", "Single Parent Mother", "Single Parent Father", "Extended"}
4. **Nationality:** Although many people do not have a problem when working with other nationalities, some of the TCNs might have. To avoid respective conflicts and communication problems in co-habitation groups, the agent should respect the preference of its TCN about being assigned to a group with other nationalities than her own one, or not. A TCN could prefer being member of *same or mixed* gender group. **Selectable Options:** {"Don't mind", "Same", "Mixed"}
5. **Religion:** A TCN could prefer to be in a *mixed or same* religion group. **Selectable Options:** {"Don't mind", "Same", "Mixed"}
6. **Ethnicity:** A TCN could prefer to be in a *mixed or same* ethnic group. **Selectable Options:** {"Don't mind", "Same", "Mixed"}
7. **Apartment preferences:** A TCN could specify rental flat or apartment related preferences
  - a. **Location (area) of apartment:** A TCN could specify one or multiple of the following locations listed below, as preference. **Selectable Options:** {"Don't mind", "Ampelokipoi", "Menemeni", "Kalamaria", "Eleftherio-Kordelio", "Evosmos", "Agios Pavlos", "Neapoli", "Pefka", "Sykies", "Nea Efkarpia", "Polichni", "Stavroupoli", "Pylaia", "Thessaloniki", "Triandria"}

- b. **Accessibility (disabled accessible):** A TCN could select *yes* or *“Don’t mind”* for availability of accessibility. **Selectable Options:** {“Don’t mind”, “Yes”, “No”}
- c. **Rental period (from-to):** A TCN could specify a *start and end date* as a range, for his/her preferred rental period. **Selectable Options:** {“Don’t mind”, Range (from-to)}. E.g. 2021-03-01 -> 2022-07-01
- d. **Share with:** A TCN could specify a *minimum and maximum number* as a range as the number of people that he/she prefers to share the apartment with. **Selectable Options:** {“Don’t mind”, Range (from-to)}. E.g. 2 -> 4

#### **(B) Cohabitation group constraints**

1. All members of a cohabitation group have most similar individual constraints (preferences) for rental apartment sharing.
2. All members of a cohabitation group should be able to communicate among each other in at least one common language.

***Please note that the cohabitation group constraints above are key/informal points that the TCNs themselves could adjust (with PRAKSIS) if appropriate.***

## CHC Data Records

CHC feature to be tested and evaluated with the examples in CHC\_Data\_Records (TCN Profiles)\_v1.0.xlsx file. Each example consists of various TCN profiles in terms of their amount and preferences. Additionally, all example data records are realistic. Everyone has a corresponding family type. E.g. a Male doesn’t have a Single Woman family type.

Since there are 10 preferences and each of them can take lots of different values (e.g. age can be any number higher than 18 and lower than 75), the amount (combination) of different TCN profiles is huge. All of them cannot be reflected and tested. People (TCNs) might tend to prefer other people (TCNs) who are similar to them but also people (TCNs) could prefer completely dissimilar attributes. The examples cover both cases.

TCN profiles are not randomly or artificially created. Because of privacy issues, no real world data (real TCN profiles) is (provided) used for evaluation purposes. The profiles below are created one by one and always considering for each profile whether such a TCN (person) could exist. **And it is approved by PRAKSIS that the profiles are realistic.**

Since there are too many preferences and TCNs in CHC, the rows and columns don’t fit in Word Tables. Therefore, example data records are stored in CHC\_Data\_Records (TCN Profiles)\_v1.0.xlsx file.

### Example 1

Check CHC\_Data\_Records (TCN Profiles)\_v1.0.xlsx file for corresponding TCN profiles.

### Example 2

Check CHC\_Data\_Records (TCN Profiles)\_v1.0.xlsx file for corresponding TCN profiles.

### Example 3

Check CHC\_Data\_Records (TCN Profiles)\_v1.0.xlsx file for corresponding TCN profiles.

### Example 4

Check CHC\_Data\_Records (TCN Profiles)\_v1.0.xlsx file for corresponding TCN profiles.

### Example 5

Check CHC\_Data\_Records (TCN Profiles)\_v1.0.xlsx file for corresponding TCN profiles.

## CHC Configurations

### Configuration 1

#### Importance weights of preferences:

**Characteristic:** default importance weights specified by PRAKSIS

Age Preference: 10  
Gender Preference: 9  
Family Preference: 5  
Nationality Preference: 8  
Religion Preference: 6  
Ethnicity Preference: 7  
Location Preference: 2  
Accessibility Preference: 3  
Rent Period Preference: 1  
Share With Preference: 4

**Minimize the number of singleton TCNs:** No

### Configuration 2

#### Importance weights of preferences:

**Characteristic:** Age, Gender and nationality preferences are very important compared to apartment preferences.

Age Preference: 10  
Gender Preference: 10  
Family Preference: 3  
Nationality Preference: 10  
Religion Preference: 8  
Ethnicity Preference: 9

Location Preference: 1  
Accessibility Preference: 1  
Rent Period Preference: 1  
Share With Preference: 2

**Minimize the number of singleton TCNs:** Yes

### Configuration 3

**Importance weights of preferences:**

**Characteristic:** Apartment preferences are more important compared to Configuration 1 and 2.

Age Preference: 4  
Gender Preference: 7  
Family Preference: 5  
Nationality Preference: 7  
Religion Preference: 7  
Ethnicity Preference: 5  
Location Preference: 4  
Accessibility Preference: 7  
Rent Period Preference: 4  
Share With Preference: 5

**Minimize the number of singleton TCNs:** Yes

## CHC Results and Evaluation

Each solution for a **data record (example) and configuration pair** will be evaluated with Customer Satisfaction Score (**CSAT**) metric on a Likert scale shown below:

- ➔ 5: very satisfied
- ➔ 4: satisfied
- ➔ 3: neither satisfied nor dissatisfied
- ➔ 2: dissatisfied
- ➔ 1: very dissatisfied

### Results-Example 1

- **Configuration 1**
  - **Total computation time:** 63 seconds
  - **Solution:**

- ✓ **Singleton:** [8, 1, 4, 11]
    - Group1:** [7, 14]
    - Group2:** [9, 10, 12, 15]
    - Group3:** [2, 13]
    - Group4:** [3, 5, 6]
  - **Customer Satisfaction Score on Likert scale:** 4
- **Configuration 2**
  - **Total computation time:** 71 *seconds*
  - **Solution:**
    - ✓ **Group1:** [tcn4, tcn8, tcn11, ]
    - Group2:** [tcn3, tcn5, tcn6, ]
    - Group3:** [tcn9, ]
    - Group4:** [tcn1, tcn10, tcn12, tcn15, ]
    - Group5:** [tcn2, tcn13, ]
    - Group6:** [tcn7, tcn14, ]
  - **Customer Satisfaction Score on Likert scale:** ?
- **Configuration 3**
  - **Total computation time:** 62 *seconds*
  - **Solution:**
    - ✓ **Group1:** [tcn1, tcn4, tcn9, tcn11, tcn15, ]
    - Group2:** [tcn13, ]
    - Group3:** [tcn10, tcn12, ]
    - Group4:** [tcn3, tcn5, tcn6, ]
    - Group5:** [tcn2, tcn7, tcn8, tcn14, ]
  - **Customer Satisfaction Score on Likert scale:** ?

## Results-Example 2

- **Configuration 1**
  - **Total computation time:** 60 *seconds*
  - **Solution:**
    - ✓ **Singleton:** [2, 5, 6, 9, 10, 20]
    - Group1:** [1, 16]
    - Group2:** [15, 17]
    - Group3:** [3, 7, 8, 12, 13, 19, 4, 11, 14, 18]
  - **Customer Satisfaction Score on Likert scale:** 4
- **Configuration 2**
  - **Total computation time:** 61 *seconds*
  - **Solution:**
    - ✓ **Group1:** [tcn2, tcn6, tcn9, tcn10, tcn20, ]
    - Group2:** [tcn1, tcn16, ]
    - Group3:** [tcn5, ]
    - Group4:** [tcn4, tcn7, tcn8, tcn11, tcn12, tcn13, tcn14, tcn19, ]
    - Group5:** [tcn3, tcn15, tcn17, tcn18, ]
  - **Customer Satisfaction Score on Likert scale:** ?

➤ **Configuration 3**

- **Total computation time:** *64 seconds*
- **Solution:**
  - ✓ **Group1:** [tcn2, tcn5, tcn6, tcn8, tcn9, tcn15, tcn17, tcn20, ]
  - Group2:** [tcn1, tcn16, ]
  - Group3:** [tcn14, ]
  - Group4:** [tcn4, tcn10, ]
  - Group5:** [tcn13, ]
  - Group6:** [tcn7, tcn11, tcn12, tcn19, ]
  - Group7:** [tcn3, tcn18, ]
- **Customer Satisfaction Score on Likert scale:** ?

Results-Example 3

➤ **Configuration 1**

- **Total computation time:** *67 seconds*
- **Solution:**
  - ✓ **Singleton:** [3, 5, 6, 7, 9, 10, 13, 19, 1, 11, 14, 18, 20, 21, 23]
  - Group1:** [15, 24]
  - Group2:** [2, 8, 17, 16, 25]
  - Group3:** [12, 22, 4]
- **Customer Satisfaction Score on Likert scale:** 4.25

➤ **Configuration 2**

- **Total computation time:** *72 seconds*
- **Solution:**
  - ✓ **Group1:** [tcn1, tcn3, tcn6, tcn7, tcn11, tcn13, tcn18, tcn20, tcn21, tcn24, ]
  - Group2:** [tcn14, tcn23, ]
  - Group3:** [tcn5, tcn9, tcn10, tcn12, tcn15, tcn17, tcn19, ]
  - Group4:** [tcn2, tcn8, tcn16, tcn25, ]
  - Group5:** [tcn4, tcn22, ]
- **Customer Satisfaction Score on Likert scale:** ?

➤ **Configuration 3**

- **Total computation time:** *65 seconds*
- **Solution:**
  - ✓ **Group1:** [tcn1, tcn7, tcn18, ]
  - Group2:** [tcn11, tcn20, ]
  - Group3:** [tcn2, tcn3, tcn4, tcn5, tcn6, tcn8, tcn9, tcn10, tcn12, tcn13, tcn14, tcn15, tcn16, tcn17, tcn19, tcn21, tcn22, tcn23, tcn24, tcn25, ]
- **Customer Satisfaction Score on Likert scale:** ?

Results-Example 4

➤ **Configuration 1**

- **Total computation time:** 225 *seconds*
- **Solution:**
  - ✓ **Singleton:** [2, 3, 5, 7, 8, 10, 12, 13, 17, 19, 29, 35, 42, 44, 47, 1, 4, 14, 18, 20, 21, 23, 36, 40, 41, 43, 45, 50]
  - Group1:** [6, 11, 25, 46]
  - Group2:** [9, 24, 38]
  - Group3:** [28, 39]
  - Group4:** [15, 49]
  - Group5:** [27, 37, 16]
  - Group6:** [30, 32, 31]
  - Group7:** [26, 34]
  - Group8:** [22, 33, 48]
- **Customer Satisfaction Score on Likert scale:** 4.2
- **Configuration 2**
  - **Total computation time:** 214 *seconds*
  - **Solution:**
    - ✓ **Group1:** [tcn2, tcn3, tcn4, tcn7, tcn8, tcn13, tcn14, tcn35, tcn36, tcn40, tcn41, tcn45, ]
    - Group2:** [tcn6, tcn19, tcn25, tcn43, ]
    - Group3:** [tcn18, tcn47, ]
    - Group4:** [tcn1, tcn12, ]
    - Group5:** [tcn5, tcn42, ]
    - Group6:** [tcn11, tcn46, ]
    - Group7:** [tcn10, tcn20, tcn24, tcn44, ]
    - Group8:** [tcn21, ]
    - Group9:** [tcn9, tcn17, tcn22, tcn23, tcn38, tcn50, ]
    - Group10:** [tcn15, tcn28, tcn29, tcn39, tcn49, ]
    - Group11:** [tcn16, tcn27, tcn37, ]
    - Group12:** [tcn30, tcn31, tcn32, ]
    - Group13:** [tcn26, tcn34, ]
    - Group14:** [tcn33, tcn48, ]
  - **Customer Satisfaction Score on Likert scale:** ?
- **Configuration 3**
  - **Total computation time:** 231 *seconds*
  - **Solution:**
    - ✓ **Group1:** [tcn2, tcn3, tcn4, tcn5, tcn7, tcn8, tcn11, tcn13, tcn14, tcn18, tcn20, tcn35, tcn36, tcn40, tcn41, tcn42, tcn43, tcn44, tcn45, tcn47, ]
    - Group2:** [tcn19, tcn23, ]
    - Group3:** [tcn9, tcn12, tcn25, ]
    - Group4:** [tcn16, tcn21, ]
    - Group5:** [tcn1, tcn17, tcn46, ]
    - Group6:** [tcn6, tcn24, tcn38, ]
    - Group7:** [tcn15, ]
    - Group8:** [tcn10, tcn22, tcn33, tcn48, ]
    - Group9:** [tcn26, tcn34, tcn50, ]
    - Group10:** [tcn27, tcn37, ]



- Group11:** [tcn30, tcn31, tcn32, ]
- Group12:** [tcn28, tcn39, ]
- Group13:** [tcn29, tcn49, ]
- **Customer Satisfaction Score on Likert scale:** ?

## Results-Example 5

### ➤ Configuration 1

- **Total computation time:** 514 *seconds*
- **Solution:**
  - ✓ **Singleton:** [tcn1, tcn3, tcn4, tcn5, tcn6, tcn7, tcn8, tcn11, tcn13, tcn14, tcn15, tcn17, tcn19, tcn20, tcn21, tcn22, tcn23, tcn25, tcn27, tcn28, tcn30, tcn33, tcn34, tcn35, tcn38, tcn41, tcn42, tcn43, tcn44, tcn45, tcn47, tcn48, tcn49, tcn50, tcn52, tcn53, tcn54, tcn55, tcn56, tcn59, tcn60, tcn61, tcn62, tcn63, tcn64, tcn65, tcn66, tcn67, tcn68, tcn69, tcn70, tcn72, tcn73, tcn74, tcn75, tcn77, tcn78, tcn79, tcn80, tcn81, tcn82, tcn83, tcn84, tcn85, tcn89, tcn95, tcn96, tcn100]
  - Group1:** [tcn16, tcn31]
  - Group2:** [tcn24, tcn46]
  - Group3:** [tcn10, tcn12]
  - Group4:** [tcn9, tcn18]
  - Group5:** [tcn36, tcn71]
  - Group6:** [tcn29, tcn40]
  - Group7:** [tcn58, tcn93]
  - Group8:** [tcn26, tcn98]
  - Group9:** [tcn2, tcn88, tcn99]
  - Group10:** [tcn39, tcn57]
  - Group11:** [tcn32, tcn37, tcn51, tcn76, tcn86, tcn87, tcn94, tcn97]
  - Group12:** [tcn90, tcn91, tcn92]
- **Customer Satisfaction Score on Likert scale:** 4.2

### ➤ Configuration 2

- **Total computation time:** 498 *seconds*
- **Solution:**
  - ✓ **Group1:** [tcn4, tcn6, tcn8, tcn11, tcn16, tcn25, tcn30, tcn31, tcn35, tcn38, tcn41, tcn42, tcn48, tcn53, tcn54, tcn55, tcn56, tcn59, tcn63, tcn64, tcn67, tcn68, tcn74, tcn78, tcn89, tcn95, tcn96, tcn100, ]
  - Group2:** [tcn24, tcn46, ]
  - Group3:** [tcn7, tcn23, tcn28, tcn61, tcn75, tcn79, tcn85, ]
  - Group4:** [tcn14, ]
  - Group5:** [tcn49, tcn73, ]
  - Group6:** [tcn9, tcn18, tcn72, ]
  - Group7:** [tcn10, tcn12, ]
  - Group8:** [tcn22, tcn34, tcn52, tcn65, tcn80, tcn82, ]
  - Group9:** [tcn29, tcn40, ]
  - Group10:** [tcn1, tcn44, ]

**Group11:** [tcn36, tcn71, ]  
**Group12:** [tcn62, ]  
**Group13:** [tcn58, tcn93, ]  
**Group14:** [tcn26, tcn98, ]  
**Group15:** [tcn13, tcn15, tcn17, tcn21, tcn33, tcn43, tcn47, tcn50, tcn66, tcn77, tcn81, tcn83, tcn84, ]  
**Group16:** [tcn39, tcn57, ]  
**Group17:** [tcn19, tcn69, ]  
**Group18:** [tcn5, tcn20, ]  
**Group19:** [tcn2, tcn99, ]  
**Group20:** [tcn3, tcn27, tcn32, tcn45, tcn60, tcn70, tcn76, tcn87, tcn88, ]  
**Group21:** [tcn37, tcn51, tcn86, tcn94, tcn97, ]  
**Group22:** [tcn90, tcn91, tcn92, ]

- **Customer Satisfaction Score on Likert scale: ?**

➤ **Configuration 3**

- **Total computation time:** 517 *seconds*
- **Solution:**
  - ✓ **Group1:** [tcn11, tcn16, tcn20, tcn24, tcn25, tcn41, tcn42, tcn48, tcn59, tcn63, tcn64, tcn74, ]
  - Group2:** [tcn46, tcn55, ]
  - Group3:** [tcn6, tcn8, tcn28, tcn38, tcn54, tcn68, tcn96, ]
  - Group4:** [tcn36, tcn71, ]
  - Group5:** [tcn4, tcn5, tcn10, tcn17, tcn18, tcn21, tcn23, tcn31, tcn35, tcn44, tcn45, tcn49, tcn50, tcn53, tcn56, tcn65, tcn67, tcn73, tcn75, tcn78, tcn89, tcn95, tcn100, ]
  - Group6:** [tcn1, tcn7, tcn34, tcn80, ]
  - Group7:** [tcn2, tcn82, ]
  - Group8:** [tcn79, tcn83, ]
  - Group9:** [tcn3, tcn14, tcn22, tcn29, tcn30, tcn40, tcn47, tcn61, tcn69, tcn72, tcn77, tcn85, ]
  - Group10:** [tcn13, tcn19, tcn27, tcn60, tcn70, tcn76, tcn81, ]
  - Group11:** [tcn52, tcn66, ]
  - Group12:** [tcn39, tcn57, ]
  - Group13:** [tcn9, tcn33, tcn84, ]
  - Group14:** [tcn58, tcn93, ]
  - Group15:** [tcn26, tcn98, ]
  - Group16:** [tcn12, tcn43, ]
  - Group17:** [tcn90, tcn91, tcn92, ]
  - Group18:** [tcn88, tcn99, ]
  - Group19:** [tcn15, tcn37, tcn62, ]
  - Group20:** [tcn32, tcn51, tcn86, tcn94, ]
  - Group21:** [tcn87, tcn97, ]
- **Customer Satisfaction Score on Likert scale: ?**