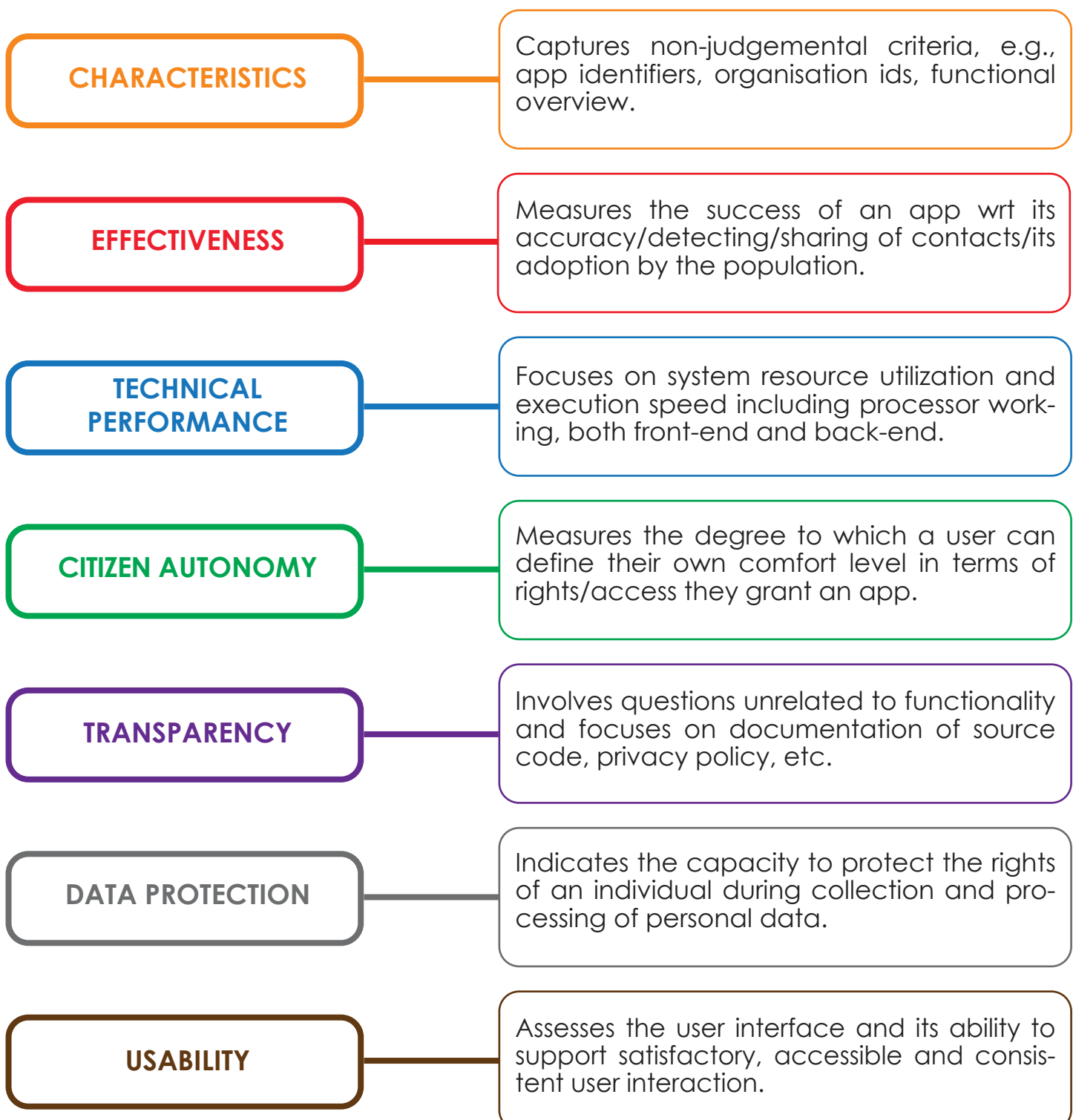


Multimedia Appendix 3

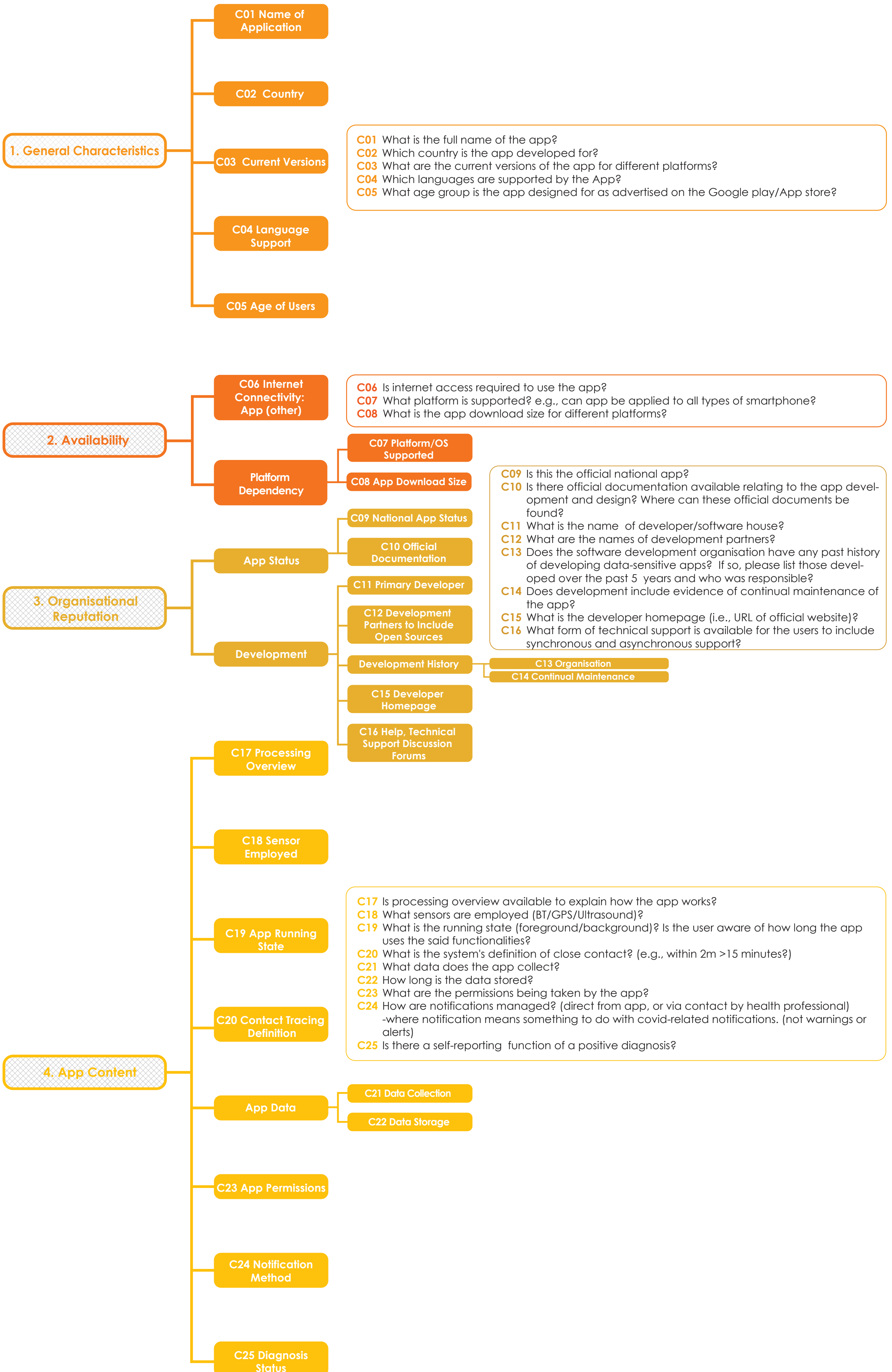
Visualization of all pillars and questions.

Citizen-Focused Compare-and-Contrast Evaluation Framework (C³EF) for digital Contact Tracing Applications (CTAs) for COVID-19

The Citizen-Focused Compare-and-Contrast Evaluation Framework (C³EF) is designed to help improve existing digital Contact Tracing Applications (CTAs) developed for COVID-19. The framework includes 7 pillars, e.g., Characteristics, Effectiveness, Technical Performance, Citizen Autonomy, Transparency, Data Protection and Usability. Each pillar has attributes, sub-attributes and at least one probing question.



CHARACTERISTICS



EFFECTIVENESS

1. Effective Reporting

E01 Detecting Close Contacts

E02 Reporting Positive Close Contacts

E03 Reporting All Close Contacts

E04 Reporting Hotspots

E01 How effective is the current version in detecting the close contacts in terms of accuracy and precision?

E02 Are users correctly alerted to positive past close contacts?

E03 Are users proactively and correctly alerted to all close contacts?

E04 How accurate is the app in alerting users to hotspots?

2. Effective Results

E05 Users Who Share Their Data

E06 No. of (Additional) Contacts/Week Found

E07 No. of Those Contacts Found Positive

E08 Relative Effort Per Contact Found Versus Manual CT

E05 What is the proportion of people alerted who share their positive status per week?

E06 What is the number of additional close contacts found through the app per week?

E07 What is the number of these people who subsequently tested positive?

E08 How much time/effort is invested in manual contact tracing versus app contact tracing (maybe activities based)?

3. Effective Engagement

E09 Population Uptake

E10 Population Retention

E11 Population Engagement

E09 How many downloads of the app?

E10 How many uninstalls of the app?

E11 Average frequency of user interaction with the app/number of active users?

TECHNICAL PERFORMANCE

1. Speed

TP01 Response Time (Frontend)

TP01 How fast (in ms) the frontend app responds to user interaction?

2. Efficiency

TP02 Response Time

TP02 How fast (in ms) the algorithm(s) responds to user interaction?

3. Consumption

TP03 Battery

TP03 How much of a battery is consumed (%) by app per day/week/month?
TP04 How much of a disk space is used by an app?

TP04 Disk Space

4. Resources and Troubleshooting & Trust

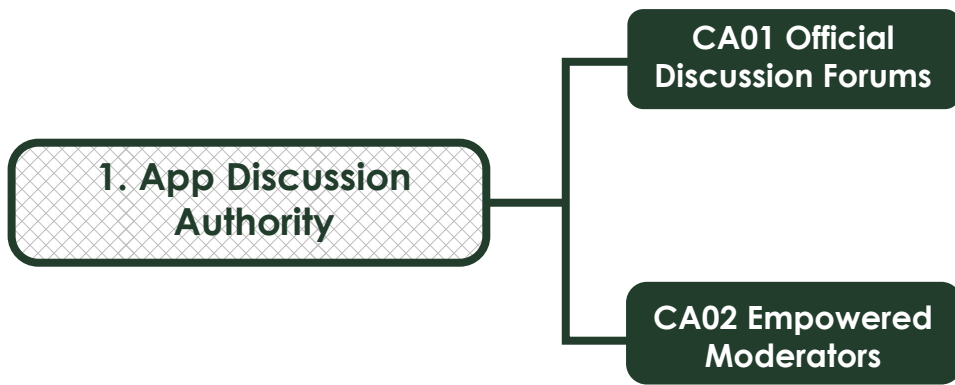
TP05 CPU/Memory Usage

TP05 How much of a CPU/memory is used by an app?
TP06 How much of a bandwidth is used by an app?
TP07 How many user requests a backend system can process per unit of time?

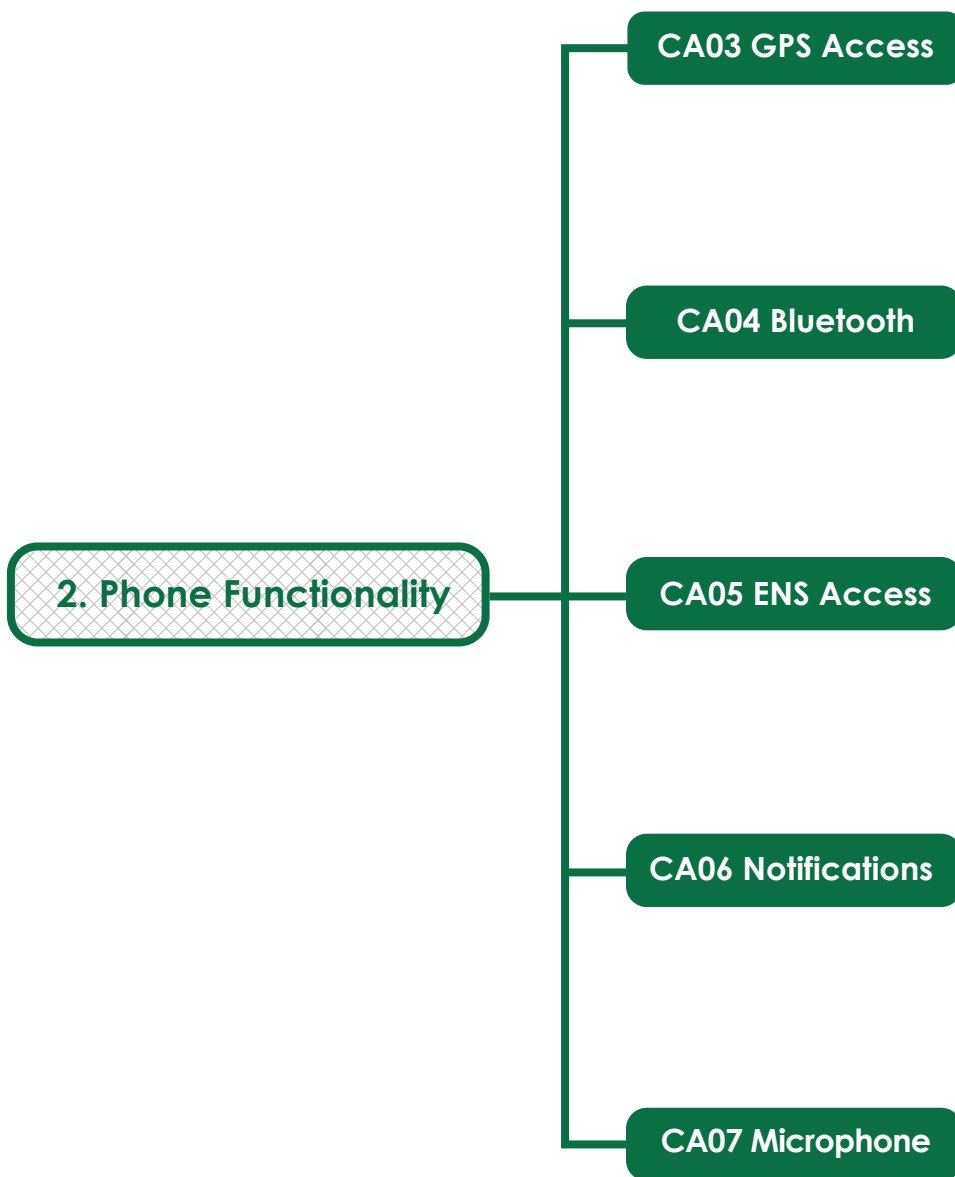
TP06 Bandwidth Usage

TP07 Throughput (Backend)

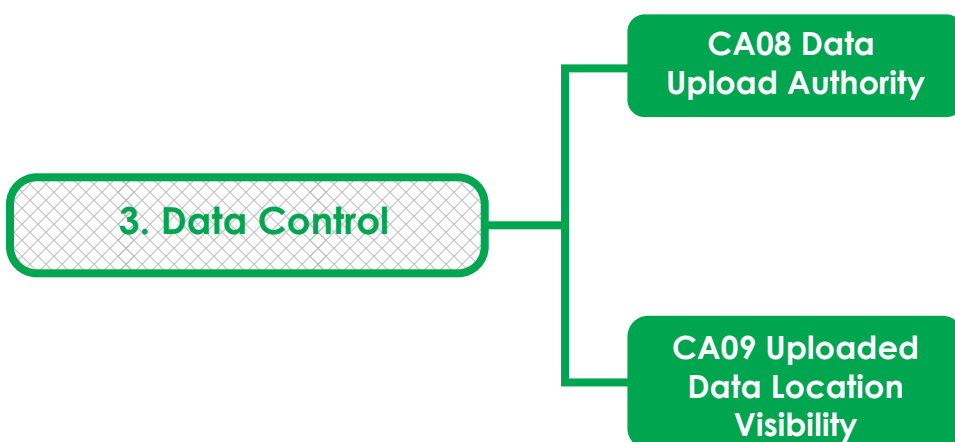
CITIZEN AUTONOMY



CA01 Is there an official discussion forum where users can express their opinions, app requirements and app bugs?
CA02 If there is such a discussion forum, are there moderators/viewers of that forum empowered to adapt the app accordingly?

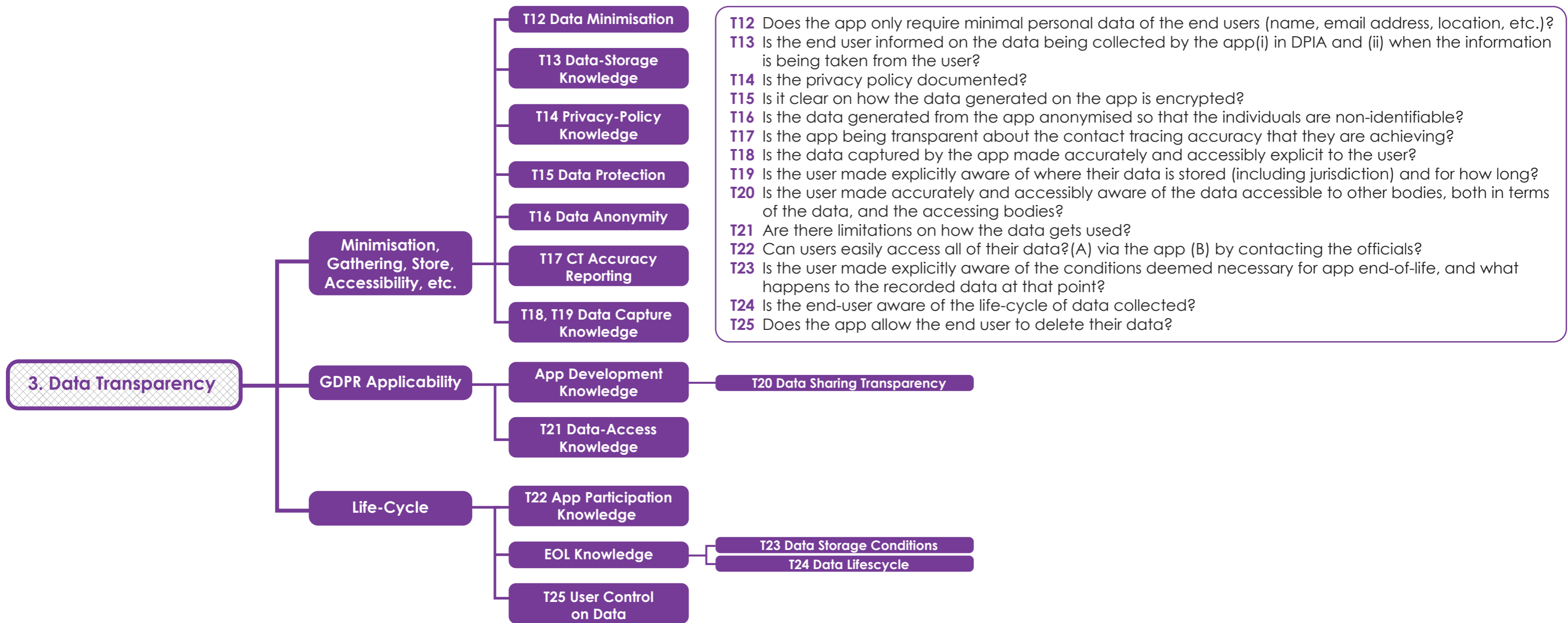
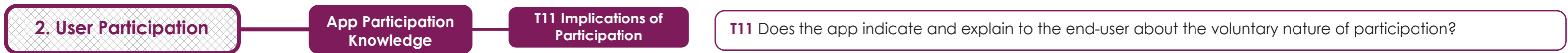
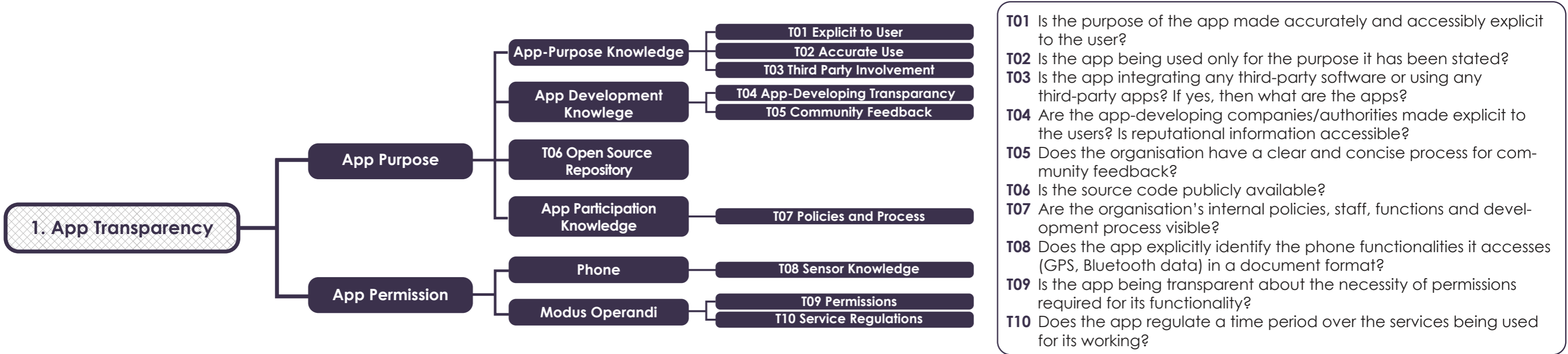


CA03 Can the user back out of allowing the app access to the GPS phone functionality?
CA04 Can the user back out of allowing the app access to the Bluetooth phone functionality?
CA05 Can the user back out of allowing the app access to the ENS phone functionality?
CA06 Can the user back out of allowing the app access to the phone notification functionality?
CA07 Can the user back out of allowing the app to record the microphone?

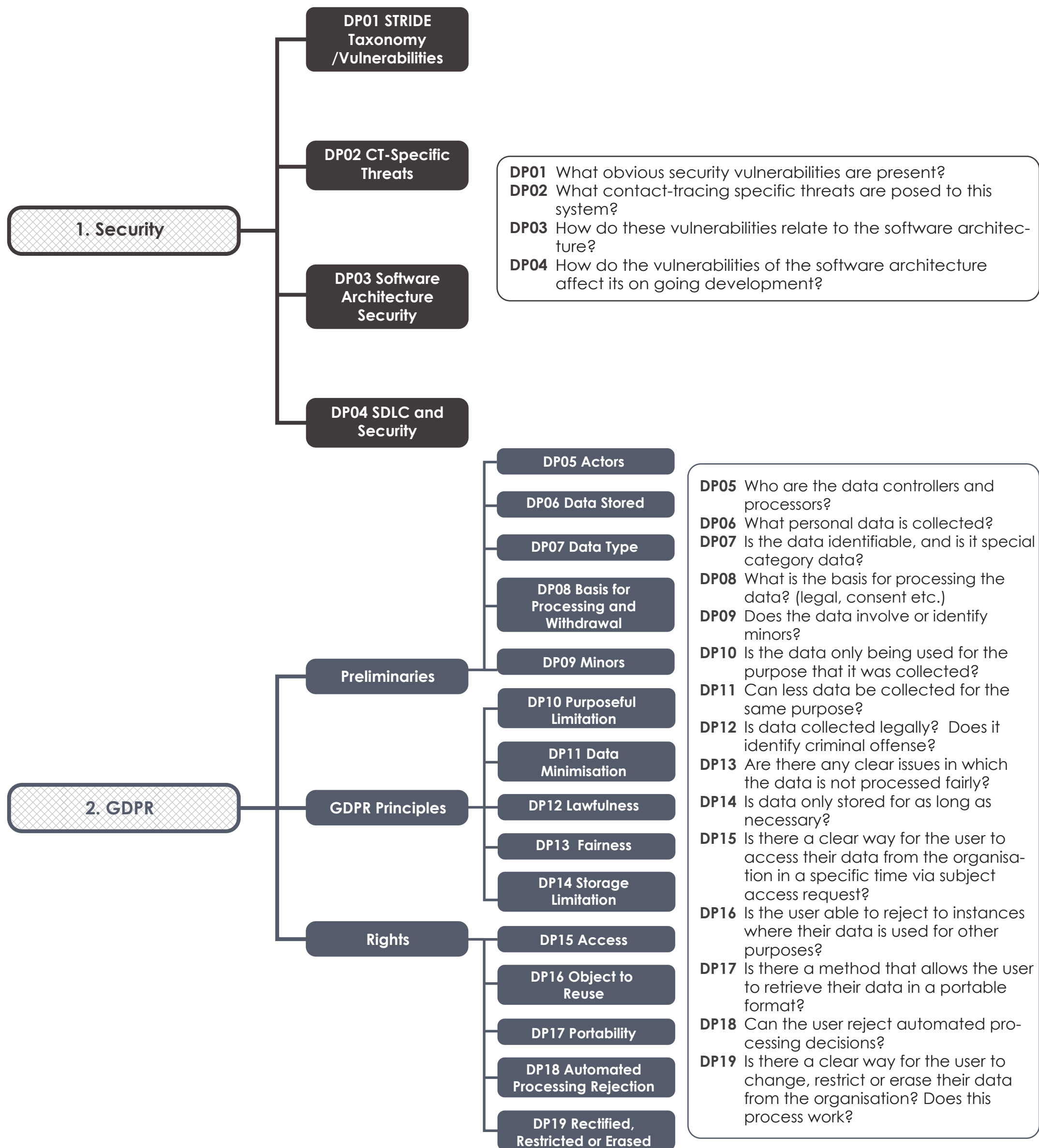


CA08 Does the user explicitly control uploading of their medical-personal/GPS/Contact/Other data?
CA09 Is there user-available information to show them where their uploaded data resides?

TRANSPARENCY



DATA PROTECTION



USABILITY

