Balancing the Public Interest with Privacy in Contact Tracing for Preventing COVID-19

FBL/PBL-2020-Spring
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Outline

1. Introduction (Ding)

1. Applications Studied (Ding)

1. Decentralized vs Centralized (Kawa)

1. Privacy-Utility Tradeoff (Patrick)

1. Conclusion(Patrick)

1. **Introduction** (Ding)

The meaning of the subject

- existing applications for contact tracing country-wise
- how to evaluate them
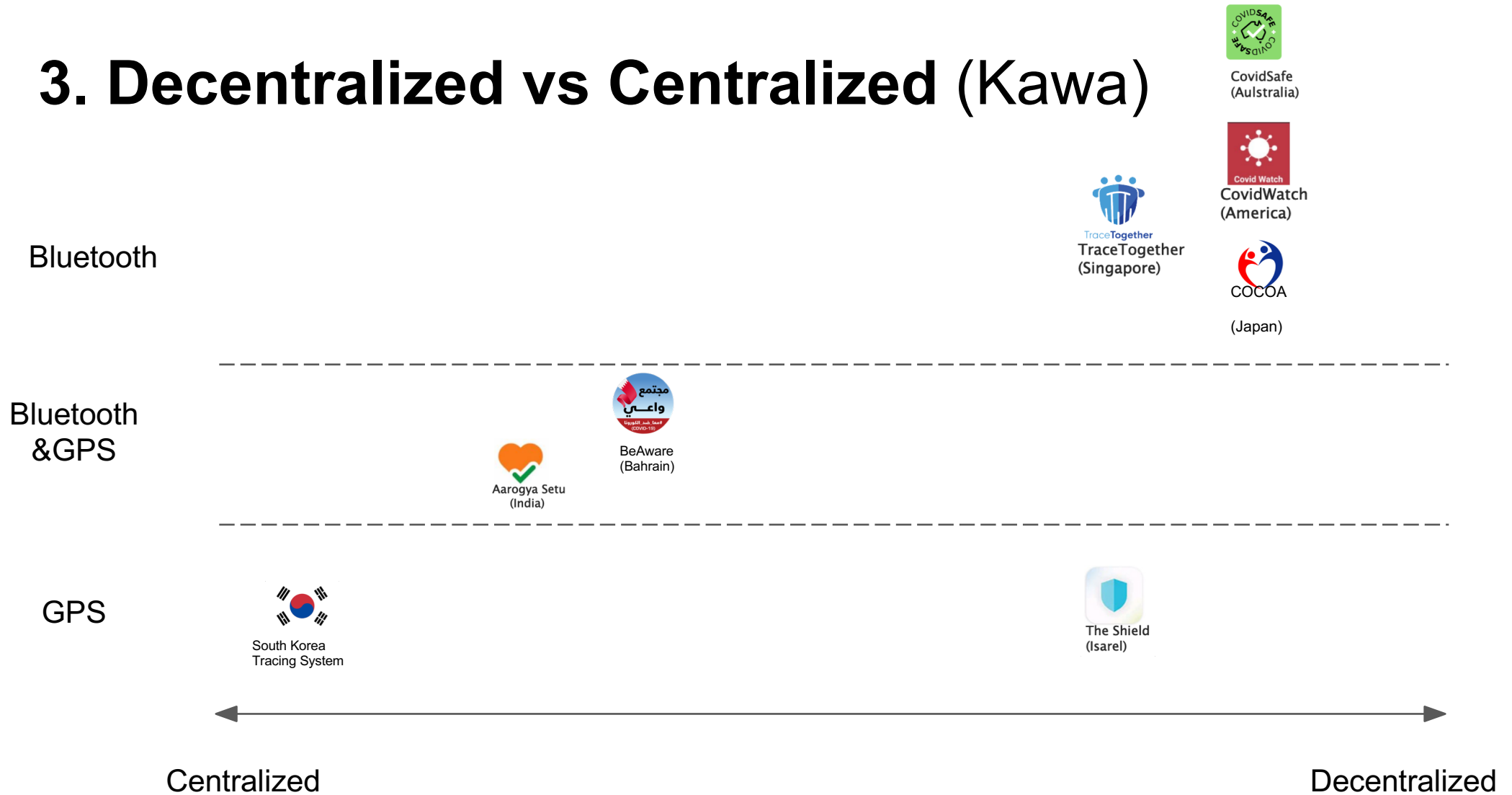- what we should do in the future

The contents of the subject

- Survey of contact tracing applications for preventing COVID-19
- Classification of the applications
- An approach to evaluate the tradeoff between public Interest and privacy
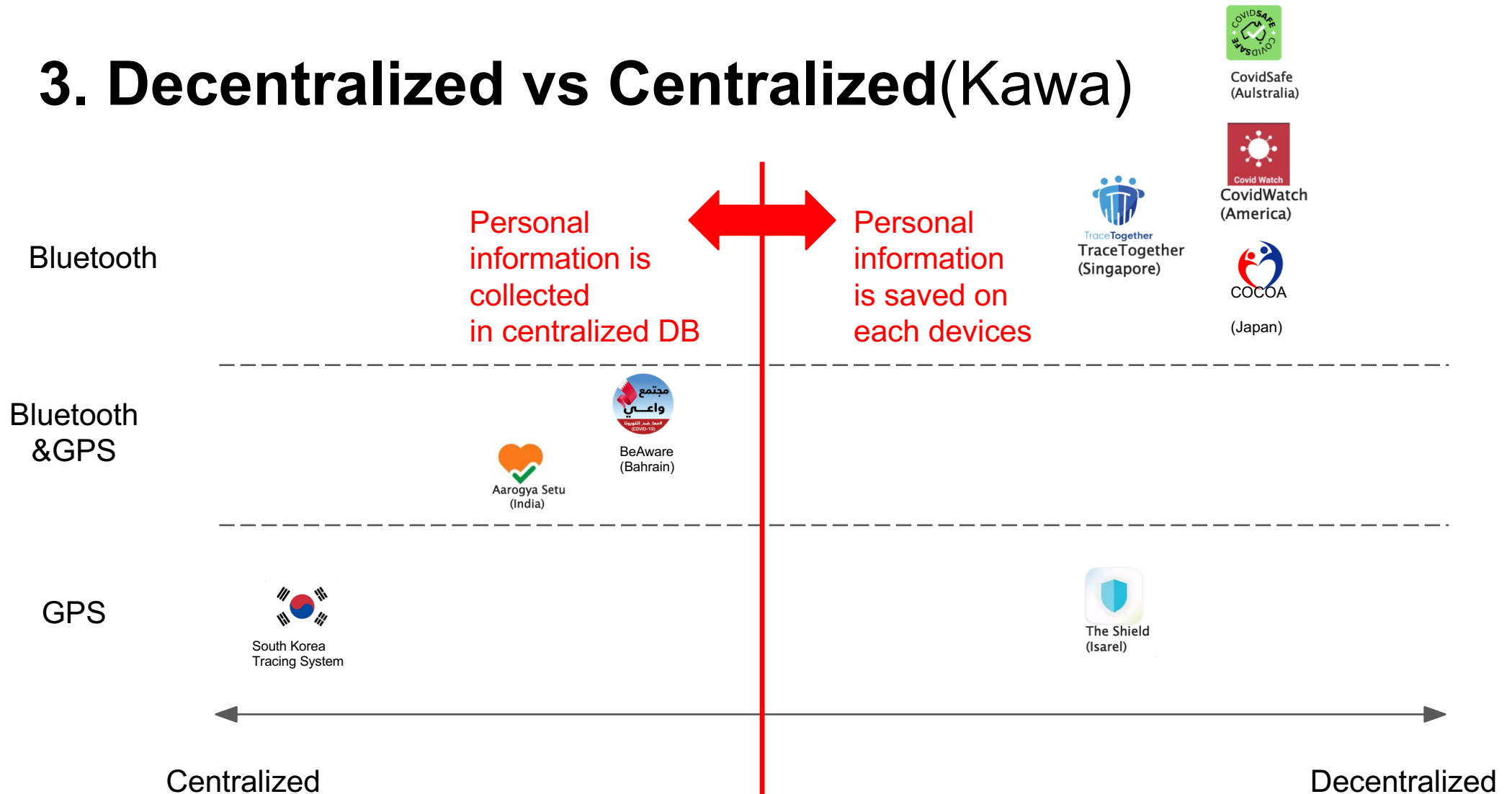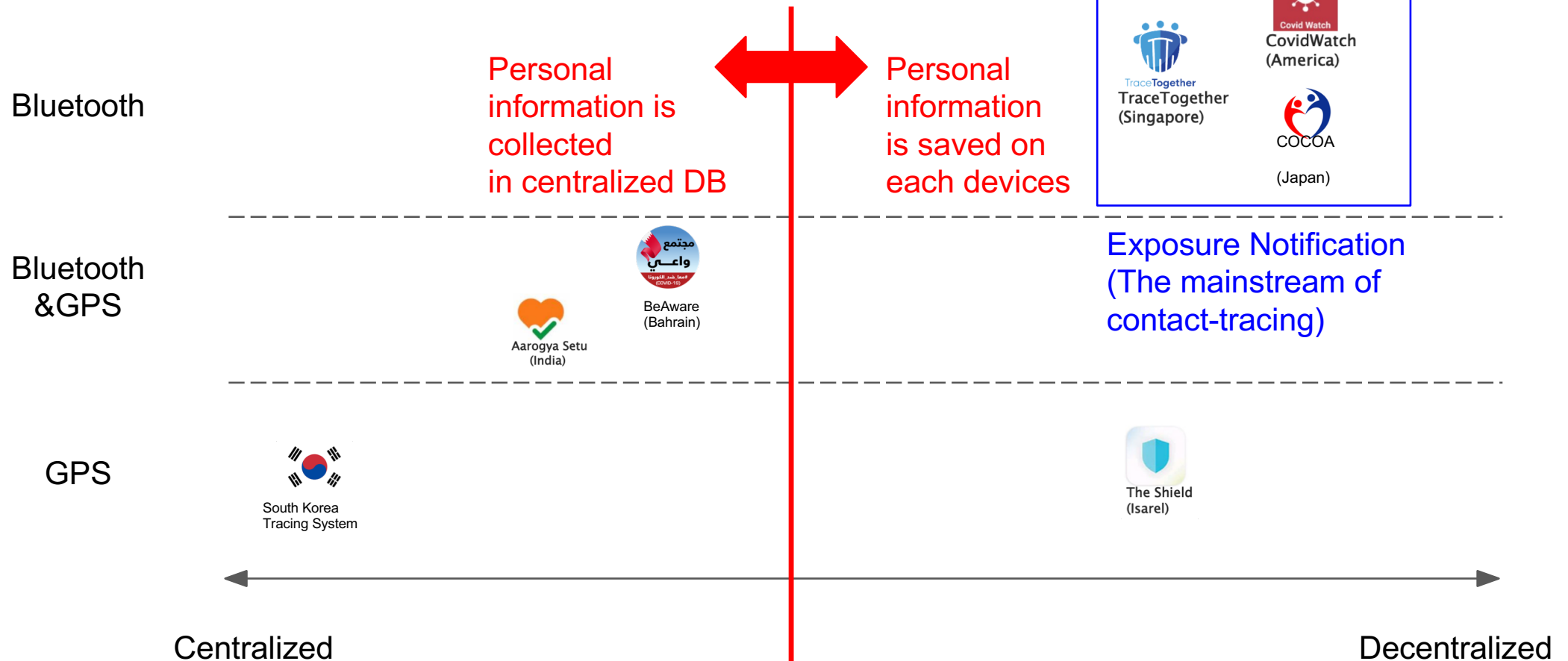
2. Applications Studied (Ding)

3. Decentralized vs Centralized (Kawa)

Bluetooth

CovidSafe
(Aulstralia)

CovidWatch
(America)

TraceTogether
(Singapore)

COCOA
(Japan)

**Bluetooth
&GPS**

BeAware
(Bahrain)

Aarogya Setu
(India)

GPS

South Korea
Tracing System

The Shield
(Isarel)

Centralized   Decentralized

3. Decentralized vs Centralized(Kawa)

CovidSafe
(Aulstralia)

CovidWatch
(America)

Bluetooth

Personal
information is
collected
in centralized DB

Personal
information
is saved on
each devices

TraceTogether
(Singapore)

COCOA

(Japan)

**Bluetooth
&GPS**

BeAware
(Bahrain)

Aarogya Setu
(India)

GPS

South Korea
Tracing System

The Shield
(Isarel)

Centralized

Decentralized

3. Decentralized vs Centralized(Kawa)

Bluetooth

Personal
information is
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CovidSafe
(Aulstralia)

CovidWatch
(America)

TraceTogether
(Singapore)

COCOA
(Japan)

**Bluetooth
&GPS**

BeAware
(Bahrain)

Aarogya Setu
(India)

Exposure Notification
(The mainstream of
contact-tracing)

GPS

South Korea
Tracing System

The Shield
(Isarel)

Centralized

Decentralized

4. Privacy-Utility Tradeoff (Patrick)

- Privacy-Utility tradeoff: How much utility can be provided at varying privacy levels? We make these **original contributions** on privacy-utility measure:
 A. **Permissibility**: the degree of privacy violation an application can have.
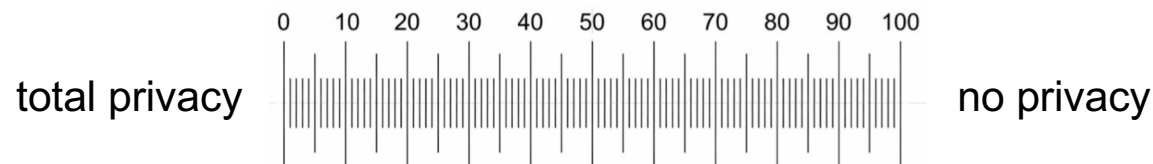
  A. **Utility@N**: Assesses how much good or original intentions of the application can be fulfilled at **N** privacy levels.
    1. *utility@0*: utility provided to the user with no privacy guarantee.
    2. *utility@100*: utility provided with no potential threats to privacy.
    3. *utility@sys*: utility the system can provide by itself whether or not the user consents to use of personal information.

4. Privacy-Utility Tradeoff (Patrick)

utility@0 = PDF + OF; *utility@100* = (1-P)*PDF + OF; *utility@sys* = P*PDF + OF

*PDF: Privacy Dependent Features; OF: Other Features; P = Permissibility*
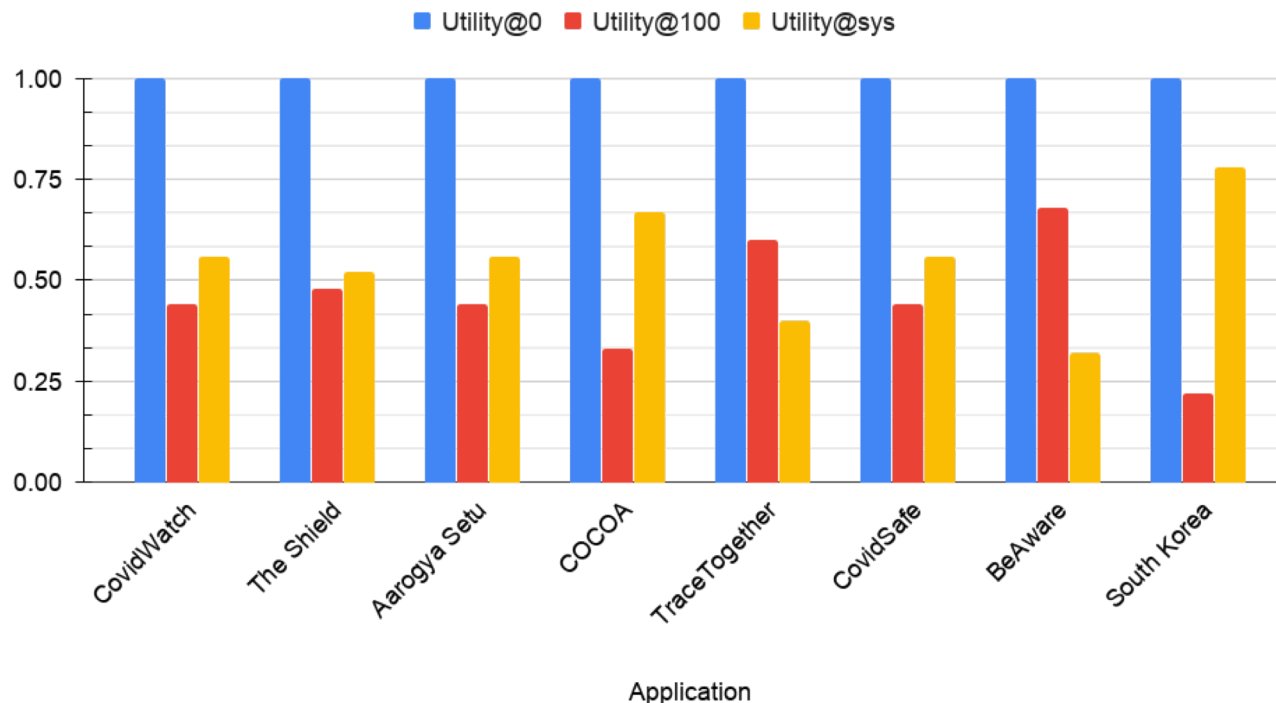
Result from a sample simulation of privacy-utility metrics of COVID-19 Apps.

- Decentralized apps generally provide better utility at max. privacy.

- Decentralized applications may not provide adequate utility on their own.

- Government-backed applications provide more utility by default/design.
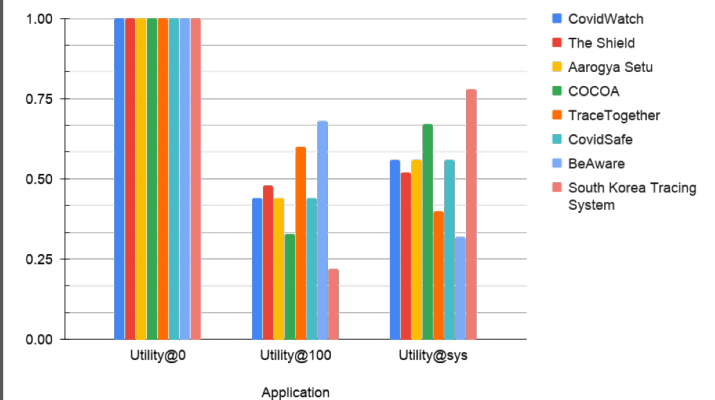
5. Conclusion (Patrick)

In this FBL/PBL course:

1. We reviewed some of the current trends in using mobile applications for contact tracing towards containing the spread of COVID-19.
2. We discussed the architectures and technologies adopted in the design of these contact tracing applications.
3. We also investigated how these applications make use of personal information and how users' privacy is being protected/violated.

In conclusion, contact tracing applications have been found useful in different scenarios. However, protecting user's privacy remains an important consideration.