Reviewing Power-Saving Approaches Used During the Actual End-User Usage of an Android Application (Stage 5)

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Analyzing and Evaluating the Amount of Power Consumption Used by Current Power-Saving-Applications on Android Smartphones

- *This paper aims at analyzing and evaluating the consumption of energy of Android power saving applications however, the study has been done in a qualitative manner. The secondary analysis has been done by evaluating the past research papers and surveys that has been done to assess the perception of the users regarding the phone power from their battery. In addition, the study highlights an issue that the notifications regarding the power saving shown on the screen seems to exploit a lot of battery. Therefore, the study has been done to reflect the ways that could help the users to save the phone battery without using any power from the same battery in an efficient manner.*

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Introduction:

- A common issue that is shared among android smartphones is to save the battery power and avoid the need of recharging resources.

- This review will focus on the <u>applications layer</u> and the main role of this layer in <u>saving the power</u> of an <u>android smartphone's battery</u>.
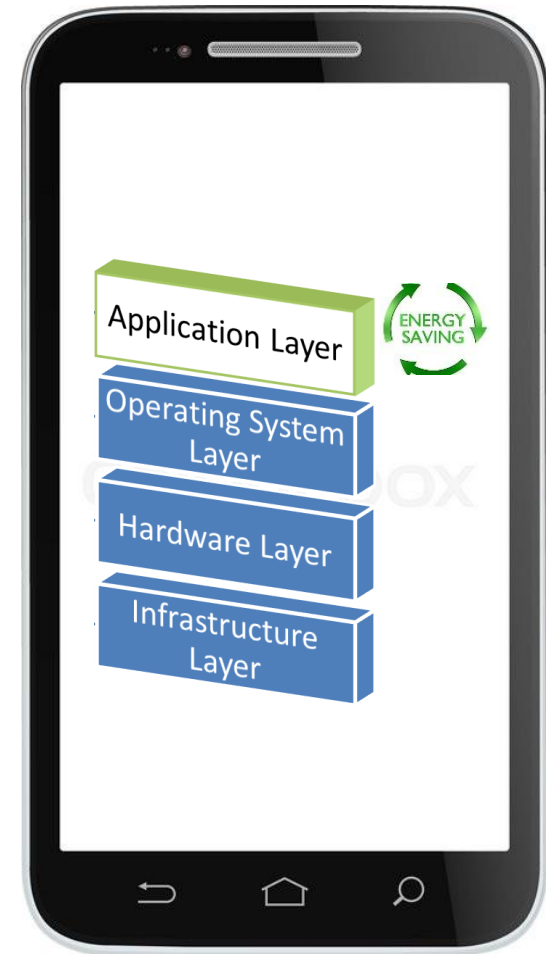
Average Android-Application-Lifecycle

- In order to demonstrate the main issues with current power-saving approaches, first we proposed showing a lifecycle that shows the main average stages of an average android application.
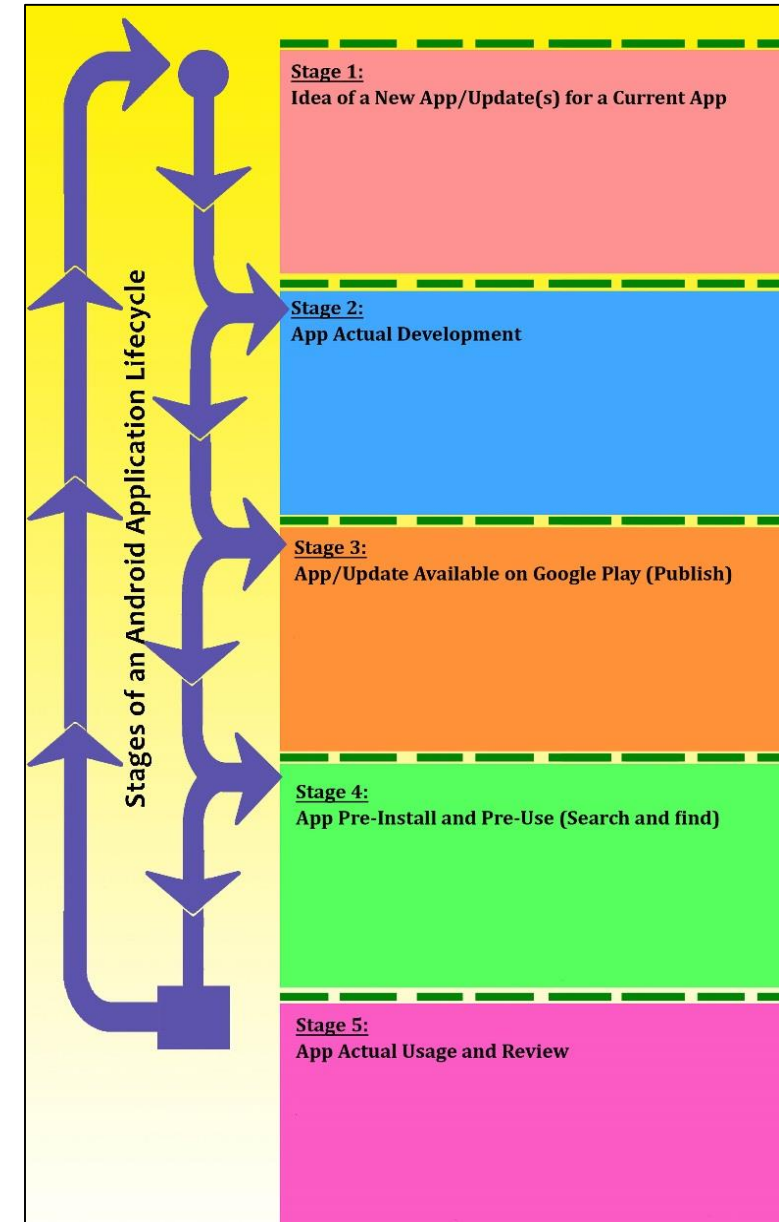
List the Concerned Parties and Identify their Involvement

- Following the previous step In order to demonstrate the main issues with current power-saving approaches, we list the parties which are involved in our android application lifecycle

| Inventor(s)/Owner(s) | Developer(s) | Google Play | End-User(s) |

# List the Concerned Parties and Identify their Involvement (Cont.)

- Next we demonstrate the involvement of the parties among the different stages of our android application lifecycle
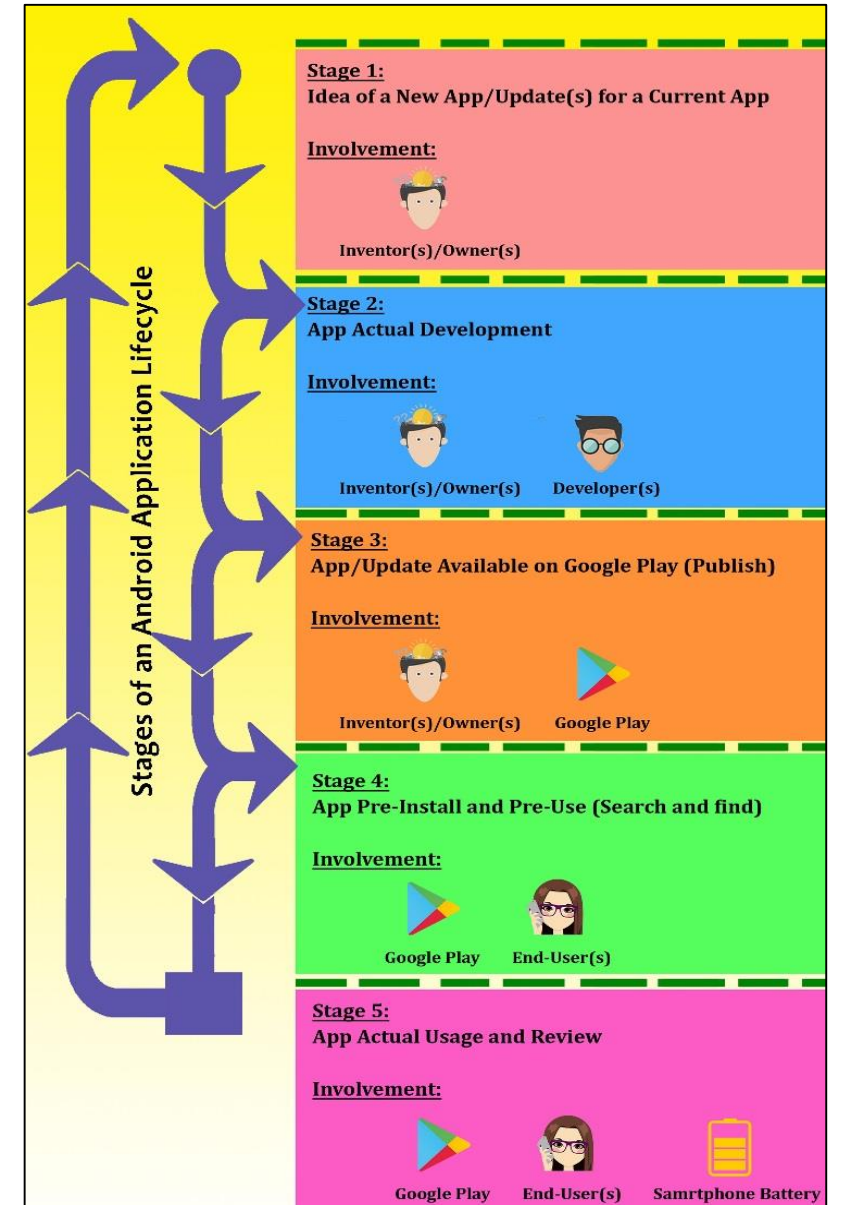
Status of App Among Different Stages of an Application Lifecycle

- List the main statuses of the application in terms of its presence in smartphone also among the different stages of the lifecycle:

  1. Outside the End-User's Phone
     (Under development or Available on Google Play)

  2. Inside the End-User's Phone
     (Installed & Running)
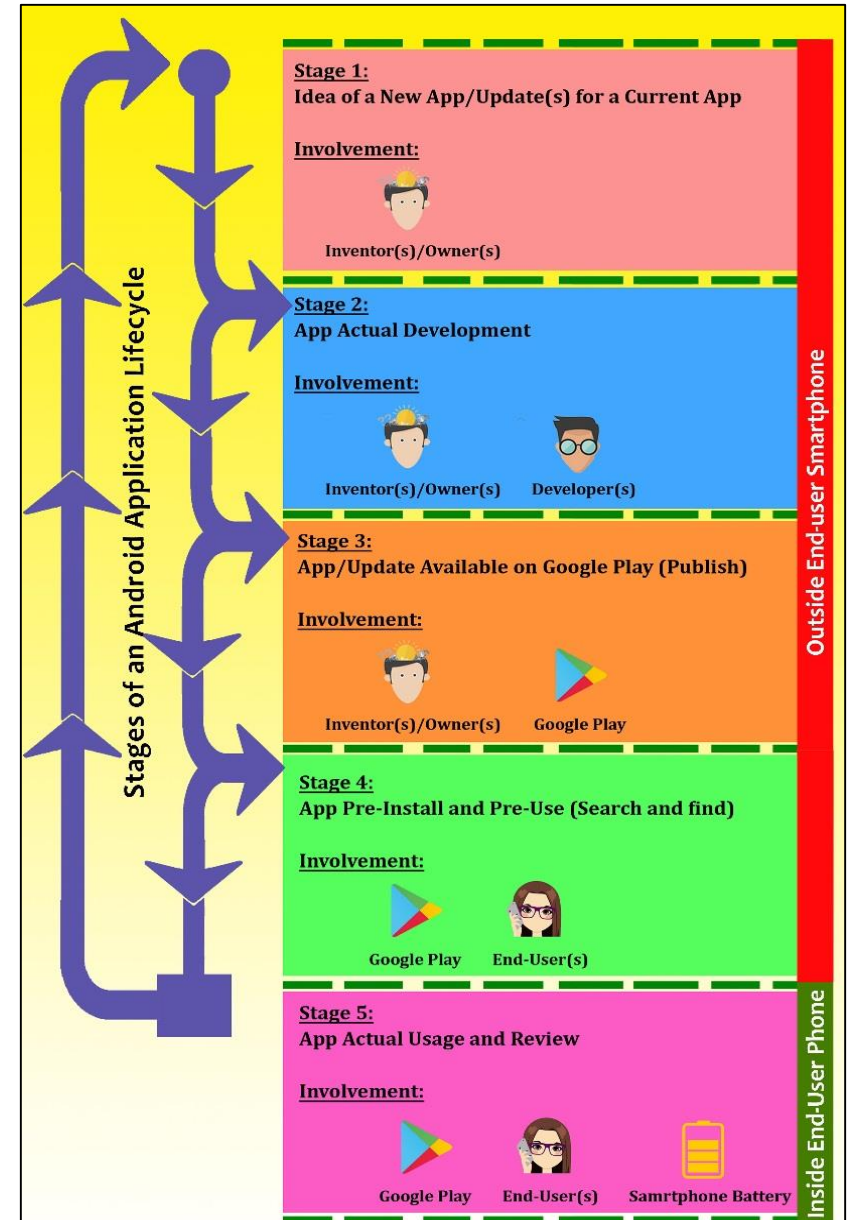
Current power-saving approaches and its usage among the lifecycle (Cont.)

Approach 1:

"Simulate and estimate" the power consumption of the application before making it available for end-user(s) by using techniques that may include green coding, energy-aware designs, smartphone batteries simulators, historical analytical data..etc.
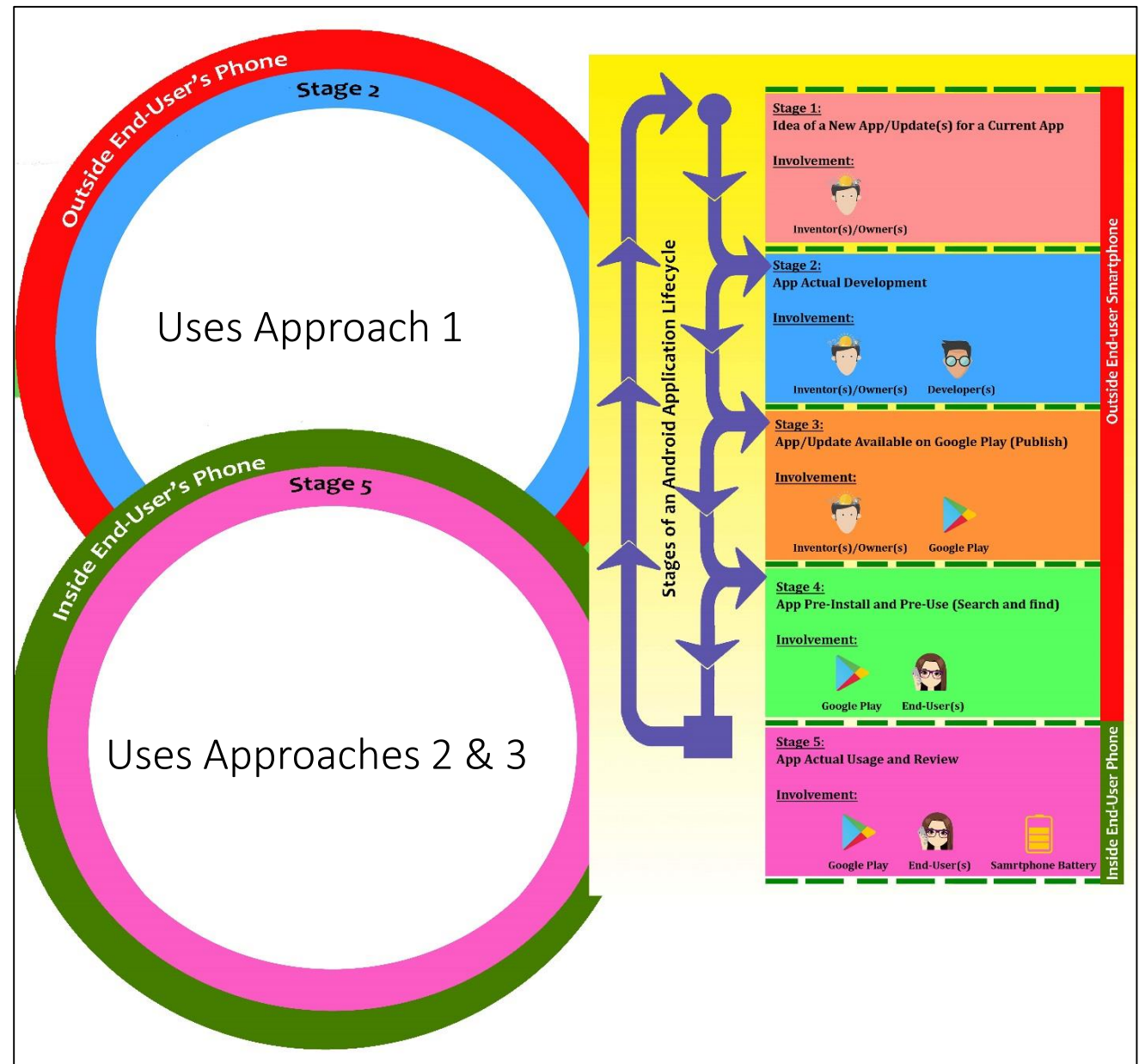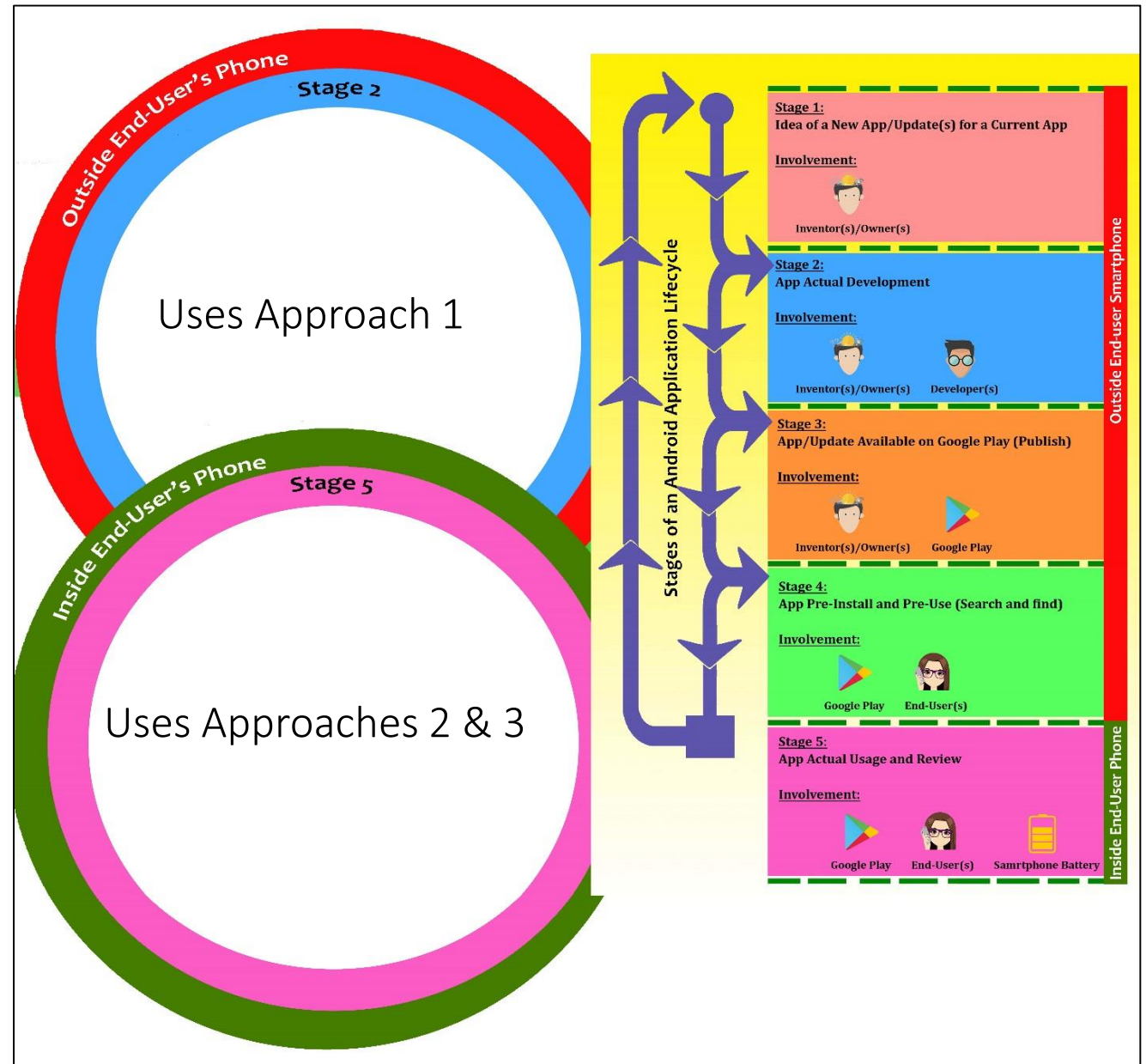
Current power-saving approaches and its usage among the lifecycle

Approach 2:

Monitor, detect and control the behavior of an android application while it is running on an end-users phone and optimizing the power consumption.
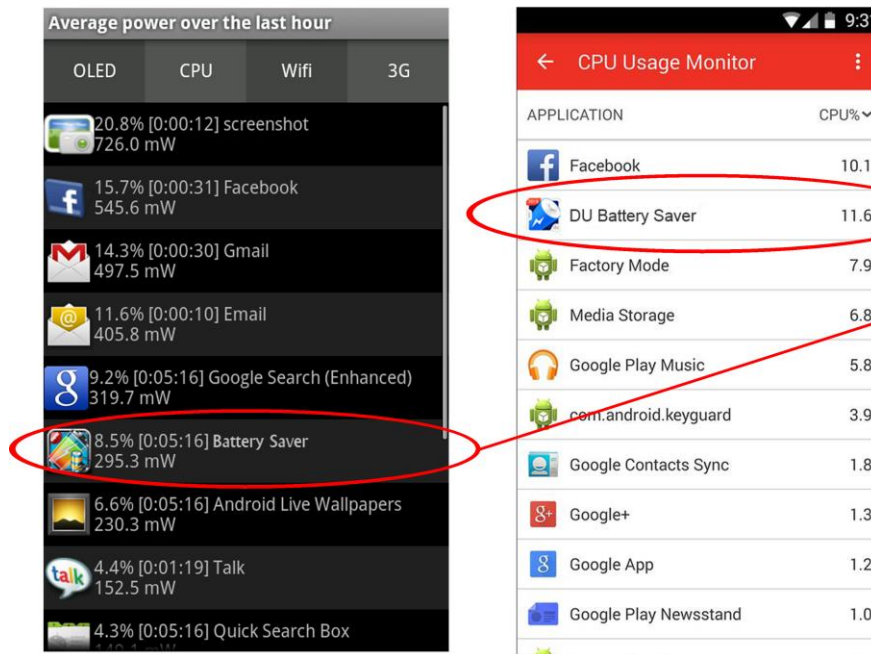
Approach 3:

Sacrifice smartphones technology or performance by switching off features for the sake of saving power

Key Issues of Power-Saving Approaches Used at Stage 5 (Inside End-User's Phone)

Key Issue of Approach 2:

- ## Requires Power !

- monitoring and announcing consumes power for the sake of saving power. Whatever runs on the application and/or the OS layers of the phone consumes power from the same phone battery.
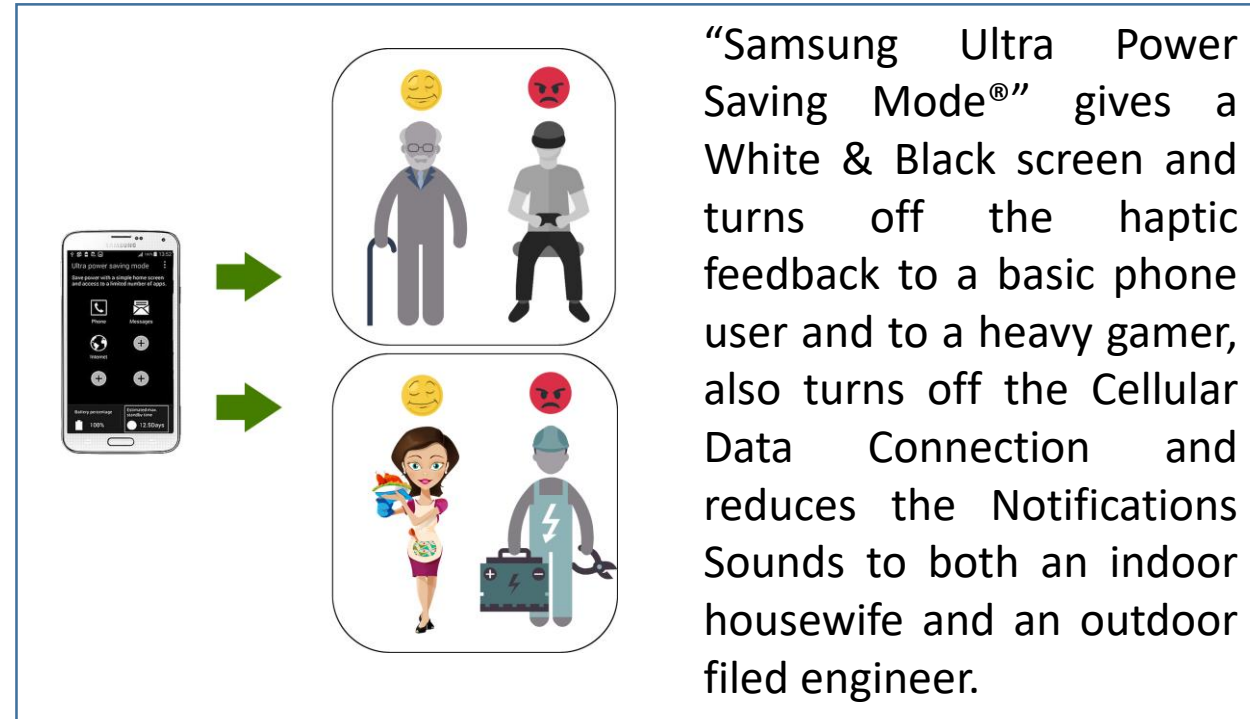
Using PowerTutor® and Trepn Profiler® to read the amount of energy consumed by two popular power-optimizing applications

Key Issues of Power-Saving Approaches Used at Stage 5 (Inside End-User's Phone) (Cont.)

Key Issue of Approach 3:

- Predefined Saving Plans does not differentiate between smartphone users in terms of using habits and claims to provide a one-size-fits-all solution.

"Samsung Ultra Power Saving Mode®" gives a White & Black screen and turns off the haptic feedback to a basic phone user and to a heavy gamer, also turns off the Cellular Data Connection and reduces the Notifications Sounds to both an indoor housewife and an outdoor filed engineer.

Key Issues of Power-Saving Approaches Used at Stage 5 (Inside End-User's Phone) (Cont.)

Key Issue of Approach 3:

- Flexible Saving Plans relies on user's personal estimations to control the phone components/technologies "on/off switches".

"Medium Power Saving Mode (Flexible Mode)" gives the user an access to a set of switches which are controlling the most power-hungry-phone-components, i.e. display brightness, network radio, resolution. then it depends on the user to decide on what to sacrifice in order to extend the phone's battery life. This strategy causes most users to ignore the idea of decreasing the level of performance and/or technology of their phones as far as the charging recourses are widely available which conflicts with general energy-saving concept.

Conclusion

- Solutions presented by approach 2 reveals most solutions that monitor and control app behavior also consume power from the devise' battery for instance E-GreenDroid, Eprof, and among others.

- Solutions in the line of approach 3 reveal that the proposed techniques use predefined saving plans that provide a one-size-fits-all approach which does not necessarily provide customized/personalized solutions for users.

While the current techniques provide some potential solutions for reducing energy consumption by mobile applications on Android-based smart-devices, the actual saved amount of power and user satisfaction still need further investigations.