SIMPLEWAY TECHNOLOGIES LTD.

The Soul Concept

Digitalization of our society and economy continues to gain momentum. By 2030, each user will have, on average, four times (4x) more devices compared to 2017. This poses challenges for current technologies due to data synchronization limitations and increased device switching friction, which lead to an inconsistent user experience for you, the user. It's time to switch from having a "collection of devices" to having a seamless, secure and private ecosystem where all your devices co-exist with each other. Your "digital soul", that is, your data, applications, settings and user experience should always be current and ubiquitous.

At SimpleWay Technologies we have created the disruptive/innovative Soul Concept so that you can stay in touch with your digital soul all the time. The patented Soul Concept provides you with a seamless, private and secure digital ecosystem by keeping your digital soul current, ubiquitous, secure and private. The patented Soul Concept with its combination of user-controlled SoulHub storage, and common operating system (OS) for devices to load and boot over private direct connections answers the challenges posed by increased digitalization to current technologies.

Several market trends such as development of unified OS, increased user need for security and privacy, and regulatory developments show the clear need for a technology like the Soul Concept. Technological trends such as improvements in connection, storage, charging and energy-efficient technologies will increase feasibility and attractiveness of the Soul Concept in the future. By providing a seamless, secure and private ecosystem, the Soul Concept will yield many benefits for you, the user.

The Soul Concept - Different devices, single soul

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1. What is the Soul Concept?

1.1. The Soul Concept

Digitalization of our society and economy continues to gain momentum. This is driven by trends such as the growth of the Internet of Things (IoT), where objects and people are interconnected through communication networks and report about their status and/or the surrounding environment. IoT will continue to be one of the key technology trends over the next decade. The number of networked devices in operation is estimated to grow from 27 billion devices in 2017 to 125 billion devices by 2030, which is an estimated cumulative annual growth rate (CAGR) of 12.5%.[1]

Given these growth trends, if global population grows from 7.6 billion in 2017 to 8.6 billion in 2030 as anticipated[2], the number of devices per person increases from 3.6 devices per person to 14.5 devices per person worldwide. Users like you will therefore have four times as many devices by 2030 compared to 2017. At the same time a number of challenges and issues are being revealed, related to everything from security to connectivity to integration, with many of these issues being intertwined.

These challenges leave users like you feeling like you have a “collection of devices”, not a seamless, secure and private digital ecosystem.

SimpleWay Technologies’ innovative Soul Concept takes a giant step forward towards addressing this problem. To understand the Soul Concept, we need to first understand the concept of a user’s “digital soul”. Your digital soul is your data, applications, settings and experience. So that you feel like you are experiencing a seamless, secure and private ecosystem; you need your digital soul to be current, ubiquitous, secure and private.

A detailed diagram of the Soul Concept is shown in Figure 1. The heart of the Soul Concept is the SoulHub, which you control. The SoulHub could be a stand-alone gadget or a smartphone or even a wearable device. Your SoulHub stores a common operating system (OS) and your digital soul. Your devices connect privately to your SoulHub, load the common OS, and boot this OS. Since you control your SoulHub, and your devices connect privately to your SoulHub, your digital soul is privately and

1 https://technology.ihs.com/596542/number-of-connected-iot-devices-will-surge-to-125-billion-by-2030-ihs-markit-says
2 https://www.un.org/development/desa/publications/world-population-prospects-the-2017-revision.html

securely synchronized between your devices. Direct connections help you enjoy faster and more reliable synchronization, leading to a more current and ubiquitous digital soul. You enjoy a more consistent user experience due to a common operating system across all devices.

It's time. It's time for you to switch from having a "collection of devices" to having a seamless, secure and private ecosystem where all your devices co-exist with each other.

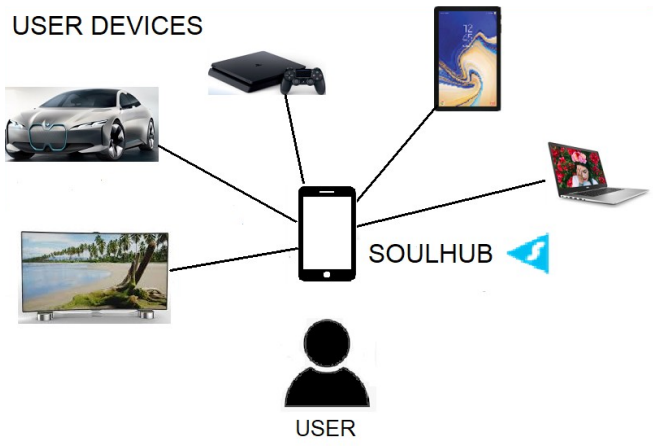

Figure 1: The SoulHub connected to your devices via private, direct wired/wireless connections

1.2. How does the Soul Concept resolve challenges posed by current approaches?

As explained above, the rapid growth in the digitalization of society poses challenges. Three key challenges posed are:

1. Synchronization
2. Device switching friction
3. Inconsistent user experience across devices

1.2.1. Synchronization

Of the 3 challenges above, synchronization is the main challenge. 3 current synchronization techniques in use are:

- Cloud-based synchronization
- P2P-based synchronization
- Local synchronization

As will be seen below, these approaches suffer from the following issues to one extent or another:

- Privacy and/or security risks.
- Loss of connectivity means loss of synchronization as well.
- Slow network speeds limit synchronization scope and speed.

These will be explored further in detail below:

Problems with current synchronization techniques: Cloud-based synchronization

Cloud-based synchronization is the most commonly used synchronization technique today. Examples of cloud synchronization can be found in Google Drive, Apple iCloud and Dropbox.

Today's cloud-based synchronization solutions suffer from privacy and security risks inherent to centralized storage. Centralizing storage means that data belonging to a large number of users is located in one facility. This incentivizes hackers to break into such facilities, because when they get in, they don't just get access to one person's data or assets, they get access to data belonging to all the users. Even the world's best and most funded technology teams cannot protect users' data adequately, as evidenced by recent major hacks and breaches, for example, iCloud (2012), Yahoo (2013), Dropbox (2014), Equifax (2017), Uber (2016), Marriott (2018), Target (2013) and Microsoft (2020).

Furthermore, a third party controls your data, not you. No doubt this concerns you, and you are not alone. In a 2019 survey[3]:

- 75% of respondents limited the amount of personal information that they shared online;
- 41% of users disagreed that data sharing improves their experience, compared to 22% who agreed; and

[3] https://www.rsa.com/content/dam/en/misc/rsa-data-privacy-and-security-survey-2019.pdf

- 29% of users agreed that providing more data leads to better products and services, which is a decrease from 31% in 2017.

Additionally, users often rely on insecure third-party networks such as public and unsecured Wi-Fi networks for cloud-based synchronization. This could leave users like yourself potentially exposed to a security threat.

The speed and scope of synchronization is reliant upon the reliability and speed of your network connections. If you lose your network connection, then you lose your ability to synchronize data. If your network connection is intermittent or slow, this seriously affects your speed of data synchronization. It could also affect your scope of data synchronization. For example, large files may take a longer time to synchronize than small files.

Finally, you may have to depend on an expensive external connection to synchronize data. This could occur if you are, for example, outside of your cellular provider's zone, necessitating that you pay expensive roaming charges.

Problems with current synchronization techniques: Peer-to-peer (P2P)-based synchronization

Another alternative is P2P-based synchronization. In a P2P-based synchronization approach, each of your devices synchronizes data with peer devices without relying on a centralized storage facility. Examples include solutions proposed by Resilio[4] and Librevault[5]. Unlike cloud-based synchronization, P2P-based synchronization utilizes decentralized or edge storage solutions. Edge storage solutions are solutions which enable you to store your data and programs at the edge of a network, that is, on your devices instead of in a third-party storage facility. If a hacker wants to get access to data belonging to a large number of users, the hacker now has to attack devices belonging to all the users. This makes it unattractive to a hacker. Furthermore, users control their own data.

However, P2P-based synchronization has limitations. As your device count increases, each of your devices has to potentially synchronize data with all your other devices, thereby requiring more network

4 https://www.resilio.com/
5 https://librevault.com/

connections and power usage to transmit data. Therefore, scalability with increased device count is a concern.

Similar to cloud-based synchronization, your devices may connect with each other over public and unsecured networks, leaving you open to potential security threats. Just like cloud-based synchronization, P2P-based synchronization may be hampered by intermittent, non-existent or slow network connections. Also, synchronization could be an expensive proposition, as your device may have to synchronize with all of your other devices over, for example, a roaming connection.

Therefore, while P2P-based synchronization resolves some of the issues faced by cloud-based synchronization, it does not resolve all the issues.

Problems with current synchronization techniques: Local synchronization

Another currently used synchronization approach is local synchronization. An example of such an approach is Tonido[6]. This is where your devices synchronize using a hub that you control. It resolves some of the issues faced by P2P-based synchronization and cloud-based synchronization. However, your devices need to connect to your local hub for synchronization, meaning that similar to cloud-based and P2P-based synchronization, you may face problems due to insecure or unreliable or slow or non-existent network connections.

How does the Soul Concept solve the problems faced by current synchronization techniques?

Since you control the SoulHub, and your devices connect to the SoulHub using private, direct connections, your digital soul is secure and private, unlike with the approaches above. Also, direct connections tend to be faster and more reliable, leading to a more current and ubiquitous digital soul and eliminating the network speed and reliability limitations detailed above. A comparison of the Soul Concept to current synchronization techniques is shown below in Figure 2:

6 https://www.tonido.com/

	SIMPLEWAY TECHNOLOGIES SOUL CONCEPT	CLOUD SYNCHRONIZATION (Drive, iCloud, Dropbox)	PEER TO PEER SYNCHRONIZATION (Resilio, Librevault)	LOCAL/PERSONAL SYNCHRONIZATION (TONIDO)
Sync Security and Privacy	SoulHub + private direct connections -> security and privacy	3rd party data storage and potentially insecure 3rd party networks	Potentially insecure 3rd party networks	Potentially insecure 3rd party networks
Sync connectivity	More reliable direct connections	Potentially intermittent or expensive 3rd party network.	Potentially intermittent or expensive 3rd party network.	Potentially intermittent or expensive 3rd party network.
Sync speed	Fast due to direct connections	May be limited by 3rd party network and server performance	May be limited by 3rd party network and peers availability	May be limited by 3rd party network and server performance.
Sync scope	Broad scope due to shared OS and direct connections	Limited by architecture and/or network restrictions	Limited by architecture and/or network restrictions	Limited by architecture and/or network restrictions

Figure 2: Comparison of Soul Concept to current synchronization techniques

1.2.2. Device switching friction

You will often need to switch between devices for different uses. Currently this switching is not frictionless. For example, file editing using same software running on different platforms results in data corruption/loss. The data synchronization challenge further exacerbates this friction.

2 current techniques used to reduce device switching friction are:

- Hybrid devices
- Unified operating systems

These techniques have the following limitations as discussed below:

Problems with current techniques to reduce switching friction: Hybrid devices

A hybrid device is a device which combines different types of devices. Examples include: 2-in-1

devices, convertibles, ASUS PadFone[7], HP Elite x3[8], and Miracast[9] technologies. Figure 3 shows different examples of current hybrid devices with their permanent and connectable/changeable components:

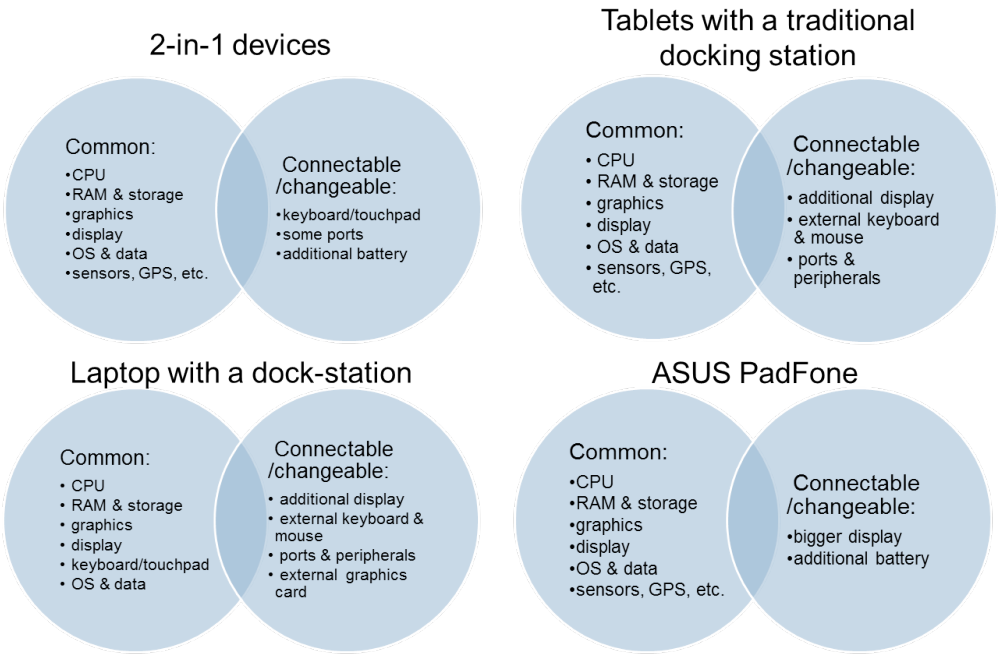

Figure 3: Various hybrid device combinations

These hybrid devices aim to reduce device switching friction by changing form factor without changing the OS. However, in reality these hybrid devices are limited as:

- Using a hybrid device gives you the illusion of change without there being real change. For example, connecting a smartphone to an external display, keyboard and mouse gives the illusion of change to a powerful “desktop” mode. In reality, the performance is still the less powerful “smartphone” mode.
- Flexibility is limited as hybrid devices are usually limited to only two device type variations.

7 https://www.asus.com/Phone/PadFone_S_PF500KL/
8 https://www8.hp.com/ca/en/ads/elitex3/overview.html
9 https://www.wi-fi.org/discover-wi-fi/miracast

- You still need to synchronize data between hybrid device and non-hybrid devices, which means that you suffer all the limitations of current synchronization techniques.

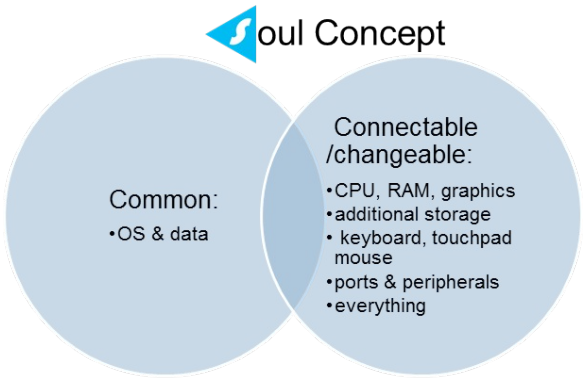

Figure 4: Soul Concept addresses the limitations of existing hybrid device combinations

Problems with current techniques to reduce switching friction: Unified operating systems

In order to address the issue of switching friction, manufacturers such as Google, Apple and Microsoft aim to build unified operating systems for different device types and form factors to reduce device switching friction. An example is Google Fuchsia. While this is similar to the Soul Concept approach, these operating systems tend to rely heavily on cloud-based synchronization. Therefore you still experience the same problems as you have currently with cloud-based synchronization.

How does the Soul Concept solve the problems faced by current techniques to reduce switching friction?

The Soul Concept addresses the limitations of hybrid devices in the following ways:

- By loading and booting a common OS on all devices, you can switch to any device you want yet have the same experience.
- Unlike existing hybrid devices, the Soul Concept allows you to optimize your performance from your ecosystem. For example, while the SoulHub is connected to a smartphone, it provides you with the flexibility of using a mobile device. When the SoulHub connects to a desktop, you get the advantage of using desktop processing power in a form factor more suited to your needs.

Since the Soul Concept uses private connections for synchronization, it does not suffer the issues of cloud-based synchronization. A comparison of the Soul Concept to current techniques to reduce device switching friction is shown below in Figure 5:

	SIMPLEWAY TECHNOLOGIES SOUL CONCEPT	HYBRID DEVICES ASUS PadFone X HP Elite x3	UNIFIED OS GOOGLE FUCHSIA
Device Switching Friction	Common OS and good data sync reduces friction	Performance limitations, limited flexibility, problems with current sync techniques add friction	Reliance on current sync solutions adds friction

Figure 5: Comparison of Soul Concept to current techniques to reduce device switching friction

1.2.3. Inconsistent user experience

The problems outlined with current solutions lead to an inconsistent and sub-optimal user experience. Users often perceive themselves as having a “collection of devices” instead of a seamless, secure and private ecosystem with a current and ubiquitous digital soul. Having to use different OSes on different devices makes adapting and learning difficult. Even in the case of unified OSes, reliance on cloud-based synchronization poses issues with security, privacy, reduced synchronization speed and scope.

1.3. Summary

By giving you control over your digital soul stored on your SoulHub, and combining the use of private direct connections for data synchronization with a common operating OS, the Soul Concept addresses

many of the limitations of current solutions, allowing you to experience a seamless, secure and private ecosystem with a current and ubiquitous digital soul. This leads to a better experience for you, the user, and is the next step forward in the evolution of computing. In the next section we detail why the Soul Concept is now more relevant than ever.

2. Why is the Soul Concept relevant now?

"No army can stop an idea whose time has come"

Victor Hugo

Several market trends show the clear need for a technology like the Soul Concept. Technological trends are likely to increase the feasibility and attractiveness of the Soul Concept for you in the future.

2.1. Market Trends

Manufacturers realize the need for many of the features of the Soul Concept, and are moving in the same direction as we are. Additionally, there are user and regulatory trends which make the Soul Concept more attractive going forward.

2.1.1. Trends in unified operating systems (OS)

As explained before, OS manufacturers like Google, Apple and Microsoft are pursuing development of unified OS[10] for multiple devices and form factors. This shows that manufacturers recognize growing user demand for seamless operation across devices with reduced switching friction.

2.1.2. User need for more security and privacy

As explained previously, users are increasingly skeptical about the benefits of sharing data online, and are increasingly limiting the amount of personal information that they share online.

Among some segments of users, for example, cryptocurrency users, there is increased user need for self-storage of sensitive data. Manufacturers have recognized and tried to meet this need. For example, Samsung Galaxy S10[11], HTC Exodus[12] and Sirin Lab's Finney smartphone[13] have secure onboard storage for cold storage of cryptocurrency. Apps to facilitate cold storage on user devices such as

[10] https://www.digitaltrends.com/computing/computing-watershed-moment-coming/
[11] https://news.samsung.com/global/samsung-raises-the-bar-with-galaxy-s10-more-screen-cameras-and-choices
[12] https://www.htcexodus.com/eu/zion/
[13] https://shop.sirinlabs.com/

Coinomi[14] are also becoming more readily available.

All of this points to an increased user need for more security and privacy which current synchronization techniques are clearly not meeting. Furthermore, regulatory trends have led to an increase in awareness of issues surrounding user security and privacy, as will be explained below.

2.1.3. Regulatory trends

Many jurisdictions around the world are becoming increasingly protective of user privacy and security. The clear leader in this regard is the European Union (EU). The EU regards protection of personal data as a fundamental right, and has enacted the General Data Protection Regulation (GDPR)[15], which is seen as one of the most stringent sets of regulations of its kind. Under the GDPR, users have the right to access, rectify and delete personal data upon request, and can submit a complaint if they feel their data is being misused. Users can also object to having their personal data used for any other purpose than that specified at the time that consent was given.

Similar laws have been enacted in California, namely the California Consumer Privacy Act (CCPA)[16]. The CCPA came into effect on January 1, 2020; and is designed to enhance user privacy rights and consumer protection. It includes an opt-out right for sales of personal information.

Additionally, user awareness of privacy issues tends to increase after enactment of such legislation. For example, in Germany[17]:

- 70% of users felt more protective of medical data after GDPR was passed compared to 63%,
- 62% of users felt more protective of their communications post-GDPR compared to 52% pre-GDPR, and
- 42% of users felt more protective of location data post-GDPR compared to 29% pre-GDPR.

2.2. Technological Trends

Several technological trends are likely to make the Soul Concept more feasible and attractive in the future. These include improved connection, storage, energy-efficient and charging technologies.

14 https://www.coinomi.com/en/
15 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0679
16 https://oag.ca.gov/system/files/attachments/press_releases/CCPA%20Fact%20Sheet%20%2800000002%29.pdf
17 https://www.rsa.com/content/dam/en/misc/rsa-data-privacy-and-security-survey-2019.pdf

2.2.1. Improved connection technologies

It is likely that you will use Wi-Fi to set up connections between the SoulHub and your devices for several reasons:

- Wi-Fi is the most used wireless connectivity technology in the world today. It can be found on almost every computer device. This makes it a technology of choice for the connections.
- Wi-Fi can be made secure and private.

There are several trends which will make Wi-Fi even more attractive in the future.

- Currently, Wi-Fi speeds are comparable to hard drive speeds as shown in Figure 6:

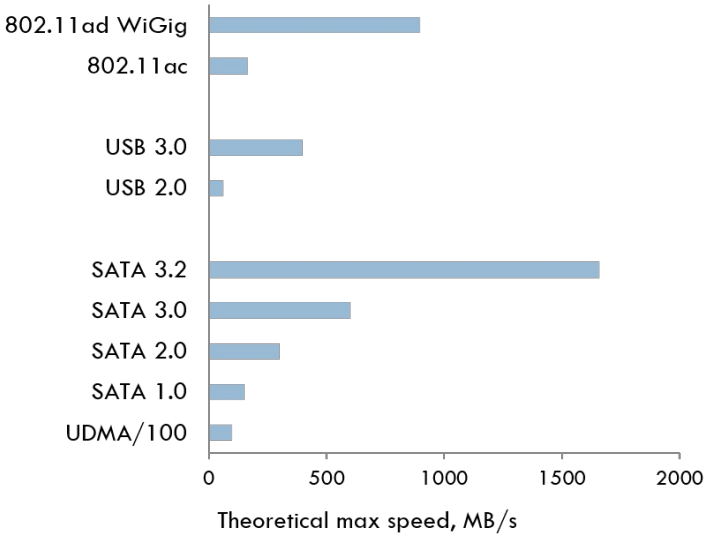

Figure 6: Wi-Fi speeds compared to hard drive speeds

- Over the last few years, the speed of wireless data transmission has grown much faster than the speed of storage interfaces as shown in Figure 7.

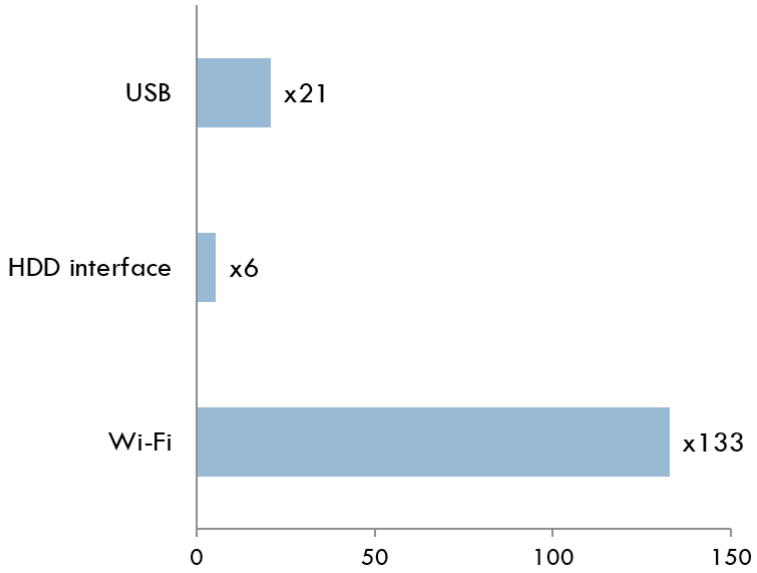

Figure 7: Throughput growth from 2004-2015 of different interfaces

- Several new high-speed standards are coming to the market such as Wi-Fi 6[18], WiGig[19] and Li-Fi[20]. This further increases the speed and reliability of connections between the SoulHub and devices.

While we suggest Wi-Fi, we foresee the possibility of other type of connections such as wireless USB, Bluetooth, or any other connectivity technology being used. Alternatively, wired connections can be used as well, for example, via a docking station.

2.2.2. Improved storage technologies

With the ever-improving density of storage, mobile device storage capacity continues to improve. For example, the new Samsung Galaxy S10 was made available with 1 TB onboard storage. It is likely that the introduction of new denser storage technologies such as Samsung's Embedded Universal Flash Storage (eUFS) will drive this trend of increased storage capacity[21].

[18] https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-6
[19] https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-wigig
[20] https://www.photonics.com/Articles/Li-Fi_Adds_Data_to_Light_the_Way/a64273
[21] https://www.forbes.com/sites/marcochiappetta/2019/01/30/heres-why-your-next-smartphone-will-have-1tb-of-storage/#5f1ff39430af

2.2.3. Improved energy efficiency and charging technologies

The SoulHub will likely need to maintain connections with devices for long periods of time. To mitigate this, since connection distances involved are likely to be short, transmission power can be adjusted to improve power-savings. Furthermore, the SoulHub is unlikely to drive displays, further reducing power consumption. Other technological trends will assist in improving SoulHub feasibility in terms of energy consumption to manage connections:

- Constant improvements in storage and processor energy efficiency will assist in reducing SoulHub power consumption.
- Proposed improvements in Soul Concept intelligent caching will help reduce the amount of transmitted data and therefore power consumption.
- Constant improvement in wireless charging techniques will improve SoulHub connection maintaining capabilities.

3. What are the benefits of the Soul Concept for you as a user?

The Soul Concept offers a variety of benefits:

- With the Soul Concept technology all documents and data are available on your computer. without
  - the need for a potentially insecure, slow, expensive, intermittent or unreliable internet connection, or
  - installing synchronizing-software on different platforms.

  This means less time lost on these activities.
- Your user experience is consistent across your devices. No need to get used to different operating systems and applications.
- The possibility of file corruption when using different applications for editing is reduced.
- You don’t need to repeat activities like changing settings, installing applications, performing software updates and antivirus scanning on dozens of different devices.
- For syncing you don’t need to upload your personal data to the cloud and expose it to privacy and security risks.
- Device replacement is extremely easy. All you need is to connect the SoulHub to the new computer, and you will get the environment that you are used to.
- Devices that use the Soul Concept can continue to use their current operating system, that is, stand-alone operation is also possible.

4. The Soul Concept – a seamless, secure and private ecosystem

As shown in Figure 8, the Soul Concept represents a big step forward in the evolution of operating systems.

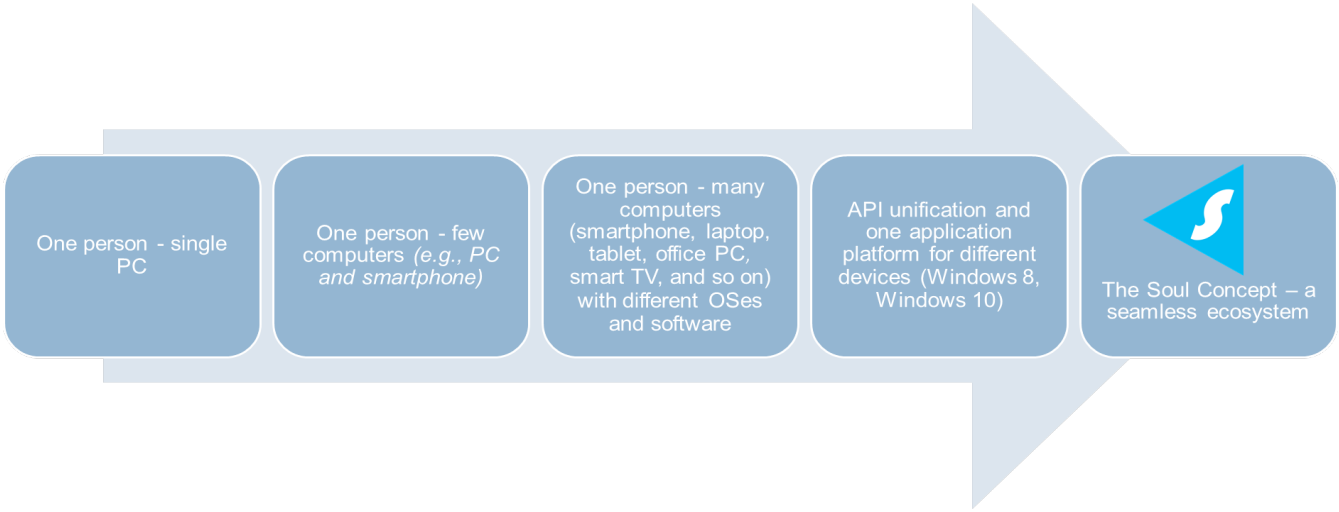

Figure 8: The Soul Concept – a seamless, secure and private ecosystem

5. Notices

“Soul Concept”, “Different devices, single soul” and  are trademarks of SimpleWay Technologies Ltd. All other trademarks are property of their respective owners.

The Soul Concept is patented. For further details, please refer to http://www.simpleway.ie/patents.php