



## User Group; User centric approach in Digital Ecosystem

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# Foreword

This Technical Report (TR) has been produced by ETSI User Group (USER).

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# Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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# Introduction

The present document has been produced by the STF 543 experts.

The concept of the full Project is to define 5-dimension model called "**ACIFO**" **The 5-dimension model is based on 5 sub-models defined as:**

- Architectural Model "Acifo": defines the global structure, including semantics and is optimized for the stated objectives.
- Communication (Relational) Model aCifo: defines the exchange protocols, including HMIs (User) and APIs (provider) exchange and management protocols over three planes:
  - Management (Monitoring)
  - Control
  - Usage
- Information Model acIf: defines the different Profiles (User, device, service). The information covers the whole ecosystem (equipment, network, applications, services, HMIs, User, etc.) from the offer to the resources availability for Users, Providers and any other partners. It is a knowledge data base representing the whole ecosystem.

- Functional Model aciFo: defines services and service composition. The functionalities (the process) to compose any service based on "micro-service".
- Organization Model aciFO: defines the role of any actor and which actor is responsible of each action. ("Who is doing what?").

These five dimensions should be shared by the user and the supplier/provider. For the user, it should be possible to define (or to choose) the level of autonomy and control for the personalized composition of services.

The four deliverables produced by STF 543 define the different dimensions:

- ETSI TR 103 438 (the present document) focuses on the Architecture and the Organization:
  - It includes the use cases and the results of the survey.
- ETSI EG 203 602 [i.5] focuses on the information and the functionalities:
  - It is dedicated to the user. It provides analysis and recommendations from the information and functionalities.
- ETSI TR 103 603 [i.6] addresses all the dimensions to the supplier, in order to produce the APIs according to the user expectations and whatever the number and types of additional suppliers.
- ETSI TR 103 604 [i.7] focuses on the communication and in particular on the HMIs.

For example, for Energy (production, distribution, consumption), the supplier will create an API for the user. The information will be exchanged between the supplier and the user but will not be used only by the supplier: the user will have access to all the information and will be able to use this information to optimize their energy consumption. This data base is a source to provide new services and new applications (for the user and for the supplier). One major challenge and constraint is to ensure that all the private data may be checked and monitored by the user (the contract needs to define clearly these points). The data are not used only by the supplier, the user should have access to the data and may refuse that the data be used or known → an interaction "cursor" between the user and the supplier defines the freedom (GDPR [i.8]).

The present document presents a new user environment based on a composition of personalized services. The structure of the present document is following:

- User context evolution to user at the heart of architecture (clause 4).
- User experience, maturity and expectations (clause 5).
- Overview, guide and reports objectives (clause 6).
- Ecosystem digital identification based on typical use-cases (clause 7).
- New vision illustrated by digital use cases for personalized Service composition and Interactions (clause 8).

---

# 1 Scope

The digital ecosystem includes all sectors of activity in which the user through smartphone, and objects are connected, that is to say capable, in addition to their main function, to send or receive information via a telecommunication network which allows to extend or diversify the functions of the smartphone and the object.

Connected objects fall, for example, in the fields of transport (connected vehicle), health (connected self-measurement), industry (connected tools), home automation (interactive electricity meter) or even daily life (connected watch).

This is why the notion that interests us in the digital ecosystem is that of considering that the user is at the heart of the architecture.

The present document focuses on the Architecture and the Organization dimensions of ACIFO, including User's QoE.

The present document details the following aspects to achieve a generic model:

- Overall results of the survey intended to collect information about user's experience, expectations and behaviours.
- User centric usages in digital ecosystem.
- New vision of digital "use cases".

---

# 2 References

## 2.1 Normative references

Normative references are not applicable in the present document.

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

**NOTE:** While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

The following referenced documents are not necessary for the application of the present document, but they assist the user with regard to a particular subject area.

- [i.1] ETSI EN 301 549: "Accessibility requirements suitable for public procurement of ICT products and services in Europe".
- [i.2] ETSI TR 103 304: "CYBER; Personally Identifiable Information (PII) Protection in mobile and cloud services".
- [i.3] ETSI TR 103 309: "CYBER; Secure by Default - platform security technology".
- [i.4] ISO 20000-1: "Service management system requirements".
- [i.5] ETSI EG 203 602: "User Group; User Centric Approach: Guidance for users; Best practices to interact in the Digital Ecosystem".
- [i.6] ETSI TR 103 603: "User Group; Guidance for providers and standardization makers".
- [i.7] ETSI TR 103 604: "User Group; User centric approach Qualification of the interaction with the digital ecosystem".

- [i.8] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the following terms apply:

**ACIFO:** 5-dimension model, based on recommendations and common objectives for Users and Providers, giving the capability for the User to compose the needed services

NOTE: The 5-dimension model creates one unique and integrated solution.

**micro-service:** basic and simple service (with SoA properties) that be combined for the composition of services as expected by the User

NOTE: The basic concept behind this term is that each service performs a unique feature (e.g. for security, "authentication" is a micro-service, for discovery, "find" is a micro-service).

**user-centric:** user who is the heart of the ecosystem

NOTE: This means that the user constrains the whole environment, unlike other contexts where that is the application (application-centric), or network (network-centric) or the system (system-centric) which constrains the context.

### 3.2 Symbols

Void.

### 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

2FA	Two Factors Authentication
ACIFO	Architecture, Communication, Information, Functionality, Organization
API	Application Programming Interface
BYOD	Bring Your Own Device
CCTV	Closed-Circuit TeleVision
CES	Customer Effort Score
DNS	Domain Name System
GDPR	General Data Protection Regulation
GPS	Global Positioning System
GSM	Global System for Mobile communications
HMI	Human Machine Interface
HTTPS	HyperText Transfer Protocol Secure
IoT	Internet of Things
IP	Internet Protocol
IT	Information Technology
ITS	Intelligent Transportation System
M2M	Machine to Machine
NFC	Near Field Communication
NGN	New Generation Network
OS	Operating System
Paas	Platform "as-a-service"
PC	Personal Computer
QoE	Quality of Experience



QoS	Quality of Service
TV	TeleVision
UX	User eXperience
VM	Virtual Machine
WIFI	Wireless Fidelity
WLAN	Wireless Local Area Network

## 4 Nowadays User context

### 4.0 Introduction

The digital ecosystem should respond to new user requirements: "anywhere, anytime, anyhow, every service, everyone". The following question is asked: what are the conditions to achieve maximum agility and flexibility of services?

The evolution of architecture to "user centric" (clause 4.1) and to the new paradigm "as a service" in digital ecosystem (clause 4.2) defines a new user digital context.

### 4.1 Evolution of the context with the concept "user centric"

The first important notion of the context of the present document is that of "User-Centric" in a digital ecosystem. That is to say that this user is above all elements. First, the users want to be able to connect to several seamless heterogeneous networks to access the services. Connectivity does not stop at link establishment, connectivity does not just mean maintaining the link, but it should allow the user to be easily connected at all times during their moving, to any network for which having the rights of access and from any terminal.

The main impact of this approach is that the ecosystem is in the service of the user, unlike other approaches where the user should comply with different processing constraints (System Centric) or application (Application Centric), or more connections (Network Centric).

Indeed:

- "System Centric" (figure 1, (a)) is based on the OS (Operating System) supported by the hardware where it is installed. The applications run parallel on this OS thanks to the "Compiler" which makes the translation and the static optimization to have a better execution of service. Although today, it should be noted that to avoid re-translations for an application because of OS changes, virtualization (VM - Virtual Machine) is proposed to hide the heterogeneity of OS. With this middle layer (Hypervisor), applications can be used on any OS.
- "Application Centric" (figure 1, (b)) focuses on the application and considers it as the starting point. The whole process takes place, from the point of view of the application, without taking into account the preferences and changes of the different actors. Only options are considered.
- "Network-Centric" (figure 1, (c)) implies that the infrastructures of the network are at the heart of the architecture, they condition all requests for services. The heterogeneity of the network imposes different solutions for a requested service through a connection support.
- With a "User Centric" approach (figure 1, (d)), it is the user who is at the centre of the architecture, they should be able to personalize their services, access them dynamically through the accesses offered during their actions, according to the QoS (Quality of Service) desired. These are the properties that the digital ecosystem should offer.

To ensure all kinds of personalization, such as tracking the mobility of the user, take into account the user's preferences according to the location, adapted to the profile, designers can no longer be satisfied with a "client/server" application architecture with options. The designers need to build a chain of services with a personalized service logic. But this service logic can only be achieved if designers have composable services. It is therefore important to have a good approach to the service. A service is neither an application nor a transaction, let alone a system. ISO 20000-1 [i.4] defines it as "a composable service that should be a source of value for the consumer and the supplier".

Designers need to think about services differently. By having an architecture allows the user to do, if they wish, their own composition of service, with dynamic changes according to the proposals made to them, throughout moving.

In conclusion, today's user moves and changes environment (network access), changes terminals, desires seamless service continuity and end-to-end service QoS. The digital ecosystem should respond to "anywhere, anytime, anyhow, every service, everyone", with a concern for transparency and automation.

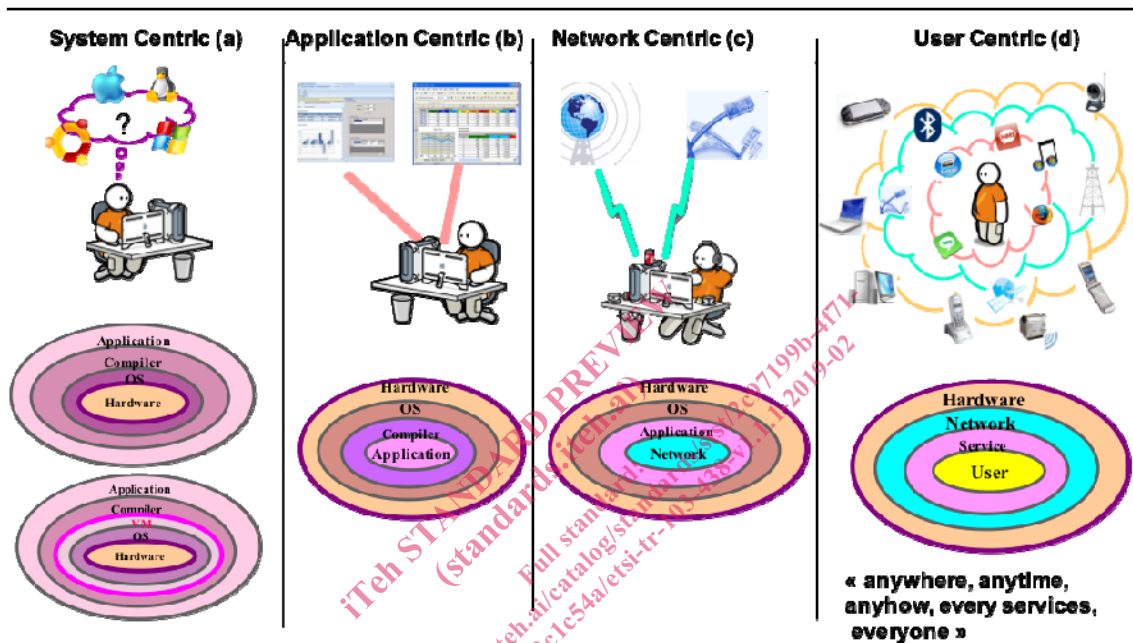


Figure 1: Evolution of the context, from System Centric to User Centric

## 4.2 User at the heart of the architecture that leads us to "as a service"

What does "as a service" mean?

Firstly, it means that the user should be able to request any service in the digital ecosystem. But how to do this, when the ecosystem is very heterogeneous. Indeed, service providers have the equipment (PC, smartphone, tablet), which allow the access to the ecosystem; or the connected objects (sensors, etc.), which monitor the user. Then service providers have the networks, which allow the ability to optimize the delivery of the ecosystem.

The user should therefore first position themselves on the right service that offers expected objectives and budgets. However, the choice of services among service providers in a highly competitive and heterogeneous environment is not easy and a consistent understanding of all end-to-end services is needed.

That is why service providers need to understand this digital ecosystem with the new paradigm "as a service".

Thus, service providers can say, secondly, that:

- the user can, depending on the level of desired personalization, make the choice and if necessary make "the composition of service";
- suppliers can submit the offers, according to a variety of specialized services offered in "self-service" and then billed at consumption.



**Figure 2: User's environment**

Figure 2 shows a users' environment. Due to the number of services, applications, networks, terminals, it is needed for the user to be the heart of the architecture, in order to make the life simpler and to offer all the potential services with high quality of service, security, safety, etc.

The following concepts are presented in these conclusions:

- User is in the heart of digital ecosystem.
- Flexible offer is possible.
- A new "as-a-service" architecture.
- The service should be fully customized in order to answer to user expectations and needs through service composition.
- Easy use "anywhere, anytime, anyhow, every services, everyone".
- Service continuity for users.

The real user expectation is QoE (Quality of Experience) presented in clause 5.

## 5 User experience

### 5.0 Introduction

A survey has been carried out in order to collect information about user's experience, expectations and behaviours.

The survey results report to note the maturity in clause 5.1 and the expectations in clause 5.2.

## 5.1 User maturity

In the Digital paradigm, users have the ability to access a large number of digital services applications and contents covering almost every time and everywhere a big part of the daily life activities, personal or professional.

So, the question is: are the users able to master all these services by themselves, or at least are the users properly informed of what can be done with the subscriptions and equipment and what is consumed?

Maturity is mainly measured by the degree of knowledge of the user about the services available, **how to activate them, how to configure them, how to control them.**

A survey has been conducted during two and half months. The questionnaire (both in French and English), the results and analysis are available in annex A.

The main lessons are:

- Currently, setting up a smartphone is far from easy according to most respondents. More than half of them say that they do not know how to fully configure their smartphone, of which 15 % say they do not really know how to do it.  
It seems like the difficulty for setting a box is a little bit higher. The survey allowed to score what is called the CES (customer effort score).
- A lot of people (42 %) do not really know the differences between the successive generations of GSM technologies. This could lead to difficulties with the advent of 5G. Specially because according to responders, cellular parameters are more difficult to set than the Bluetooth™ and the WIFI connections.

The degree of maturity of the user is partly due to his involvement, his expectations of control, and of course the diversity and frequency of the used services:

- 34 % of people change the setting of their smartphone less than once a year.
- 56 % of survey respondents never or rarely get on line to the personal page of their fix subscription and it is quite the same for the mobile (53 %). Obviously, for these people, it is difficult to have a good level of knowledge and control.

But this maturity can be greatly improved by the level of information and help tools available, the transparent attitude of the supplier, the ease of use of the services, of their configuration and customization. From this point of view there is progress to be made:

- There is a very large majority of people who would like to be able to challenge much more the provider.
- It is currently difficult to make the own composition of services because of the low scalability of the offers, and there is few values to do that because of the tariff advantages of the package.
- Currently 23 % of respondents often or sometimes have problems with the invoices. For a mass market product, it is quite high value, and not very good for confidence between consumers and providers.

The architecture and software oriented next generation networks are able to improve the flexibility and dynamic management and control of the services.

This is why it is important to look at the maturity of uses in the digital ecosystem.

The second set of lessons of the survey focuses on the user expectations.

## 5.2 User expectations

The survey sought to know the expectations of users for non-functional but essential services for a good digital experience.

First of all, it can be seen that there is a clear willing to use new services as long as their benefits are clear. That is not the today for the internet of things.