

Availability: IT is a utility

Summary

Modern societies are reliant on digital systems, so that IT is becoming regarded as a utility. Societies are also dependent on other utilities – eg water, electricity – as well as a range of other essential services¹ (OES). In this paper we² focus on utilities and their regulation and the implications for IT as a utility.

We discuss what a utility service is, how they are provided and regulated. This paper argues that digital services, over and above internet connection, should be regarded as utilities. While internet connection is an enabler, access to digital online services has also become critical for many jobs, for the economy and for society. We suggest that the additional qualities of IT services require attention by regulators, and that SLAs (Service Level Agreements) should be visible to customers of utilities³. Users have the expectation that utilities will be highly available. Appendix A defines Availability and Resilience as the terms are used throughout this series of papers.

Appendix B describes why IT is a Utility changes the emphasis and adds new skills needs. In other papers⁴ we pick up this change of perspective on provision of digital services – from innovation and transformation to “keeping the lights on” – and identify what it means for the IT profession in terms of skills and expertise.

¹ Other essential services (OES) are defined as the following sectors: Energy – electricity, oil and gas; Transport – air, rail, water and road; Health – healthcare settings (including hospitals, private clinics and online settings); Water – drinking water supply and distribution; Digital infrastructure – TLD (top-level domain) name registries, DNS (domain name systems) service providers and IXP (Internet exchange point) operators.

² In this text and others in the series of ITLF Availability Papers, “we” refers to the Availability/Service Resilience Working Group of the IT Leaders Forum of the BCS – the Chartered Institute for IT and co-opted colleagues who have provided additional insight.

³ <https://www.bcs.org/media/034nuwdr/availability-the-role-of-slas.pdf>

⁴ <https://www.bcs.org/membership-and-registrations/member-communities/bcs-it-leaders-forum/papers/>, particularly <https://www.bcs.org/media/ctlfyn05/availability-bcs-itlf-round-table-090125.pdf>

Expectations of a utility

The Oxford English Dictionary states that a utility is ‘a service or supply regarded as essential to the community.’⁵

Water, electricity, gas (mainly natural), heating oil, internet, telephone are currently defined as utilities, and this list has evolved over time.

Key influences include the availability and cost of technologies for providing these services, the organisation of their supply and the wealth of the community (which underlies both affordability and social views about whether the service is essential).

How utilities are provided

During the 20th century, modernisation became defined by the availability of services that often originated in the public sector, e.g. integrated water and sewage systems. In part, this reflected the ‘natural monopoly’ nature of these services – it made no sense to have competing suppliers for a particular community. In other cases, private initiatives were set up in communities that failed to make public provision, or for example electrical and telephonic services were initially developed using fees to recoup the costs of providing and maintaining the service.

Currently, in many countries, utilities are provided by the private sector. They are natural monopolies in a local area and the resulting monopolisation by a single supplier could and has led to prices that substantially exceed the cost of provision. Private provision became subject to regulation by government.

The emphasis of regulation for a sector may change over time – for instance a regulatory cap on price may lead to a lack of investment, which leads to a new focus arising from different customer priorities when the service deteriorates.

⁵ In the main definition of utility, the existence of ‘public utilities or simply utility’ is noted while the above definition appears in the entry for public utility. We choose to emphasise the essentiality of the service rather than the mode of supply.

The role of regulation in utilities

Regulation of utilities may cover⁶:

- universality of access
- quality of service
- continuity of service – availability⁷
- prices
- competition between suppliers.

Universality of access

Access can be limited by geographic factors (lack of connection), price factors (unaffordable to some people), and/or human factors (called universal accessibility).

Regulators may specify a time frame by which suppliers will provide universal connection. For instance, the UK Government announced in 2017 that from 2020, high-speed broadband will be considered a legal right for all its citizens, meaning service providers must offer access to any person that requests it⁸.

Price controls are a two-sided weapon – without investment, suppliers cannot maintain or enhance their provision. And governments can meet concerns on lack of affordability through a range of support mechanisms⁹, see below.

Universal accessibility has mostly been considered through the lens of disability, as a concept that extends beyond the mere removal of physical barriers. It asserts that all individuals, regardless of their physical or cognitive abilities, should be able to access and use the same services and environments¹⁰.

⁶ <https://assets.publishing.service.gov.uk/media/655dee93d03a8d000d07fe75/strengthening-the-economic-regulation-of-the-energy-water-and-telecoms-sectors.pdf>

⁷ See the Appendix for a definition of availability.

⁸ <https://www.gov.uk/government/news/countdown-to-high-speed-broadband-for-all-begins--2#:~:text=Ofcom%20now%20has%20up%20to,to%20a%20reasonable%20cost%20threshold.>

⁹ <https://helpforhouseholds.campaign.gov.uk/>

¹⁰ <https://social.desa.un.org/sites/default/files/inline-files/Paper%20Accesibilidad%20Universal%20English.pdf>

Quality of service

If a service available, what quality is assured? This depends on the nature of the utility – for instance, electricity quality defined in terms of voltage and frequency, telephonic quality is defined in terms of line noise and call completion (connection to a called party). In practice, quality is one of the features of services that are regulated in utilities.

Continuity of service – availability

Users may tolerate small interruptions if the cost of breaks in continuity (downtimes or outages) is considered inconsequential. The definition of inconsequential will be part of the regulation or governance of the service provider. In the case of private provision, there will be a direct link between profitability (or viability) and the costs of improving continuity. The trade-off between cost and continuity for publicly provided services will be resolved by negotiation between the provider and its regulator/governor (and ultimately public deliberation).

The value of continuity may change over time. In an era when electricity was principally used for household illumination, outages could be less consequential than they are now that households contain a vast array of electronic and other electricity using devices. However, although electricity supply is considered a good example of a utility, UK domestic customers do not get compensation unless they are without power for over 12 hours – which could be argued is not in line with usage. Similarly, the tolerance for internet service outages has fallen over time with even very short interruptions creating measurable harm to the users of these services.

Price control and competition

Setting price controls and promoting competition are two of the most significant activities carried out by economic regulators. We discussed price controls above.

Regulators and policy makers implement competition in the utility market¹¹ by

- removing legal and technical barriers to entry,
- monitoring anti-competitive conduct,
- restructuring the sector,

¹¹ <https://regulationbodyofknowledge.org/market-structure-and-competition/competition-utility-markets/>

- providing access to essential facilities.

Customers can, for some utilities, choose a provider. Then visibility of the SLA between the supplier and the customer provides information on which to base this choice.

Regulation of IT services

In addition to the regulated aspects of utilities above, IT services have specific topics that might be expected to be the subject of regulation. These are:

- security of online services
- social costs of disruptions.

The characteristics of IT services suggest that specific consideration is also needed for

- universal accessibility
- quality of service.

Universal accessibility

There is mounting evidence that many IT delivered services are a nuisance rather than a benefit to users, who have no choice.

For instance, the requirement of needing a PC or smartphone¹² to book an engineer visit to mend an oven, as no telephone number is provided. Or payment by phone only in Council car parks – with no viable alternative if that system is down. Or online train ticket payment systems that add without notice a £15:00 charge. Or “required” updates to PCs that take over the system and leave it in a worse state than before. Or car automation systems that steer the car sideways without warning to the (human) driver.

Regulators could be asked to provide a “right to alternate provision” for IT delivered services.

¹² a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, internet access, and an operating system capable of running downloaded apps.

Quality of service

The metrics for quality of service for IT services include availability and data integrity. Availability can be measured in lost user hours and security of online services in terms of data integrity ¹³ as in the NIS Framework.

Both could be incorporated into a user “SLA¹⁴” for the utility service.

Security of online services

Online services have a distinct quality, their information carrying capacity. Historically, telephony was often not entirely private. ‘Party lines’ and ‘crosstalk’ in networks could compromise privacy even before security and law enforcement sought backdoors to monitor individuals who were deemed a risk to society.

As online services are increasingly used to make financial transactions, the privacy and security of connections have become a desirable quality. And the further development of cyber-attacks that threaten all databases as well as individual transactions have reinforced the need for online security.

Security provisions also add to costs, particularly because the architecture of the internet was not designed for security. Although security features have been added, debates about the extent to which online services are subject to private and government surveillance continue with further implications regarding the costs of providing online services.

Social costs of disruption

The social meaning of resilience of online services is therefore more nuanced than withstanding and recovering from disruptions due to failure and attacks. It also includes consideration of the social costs of these disruptions and assurances of their limitation either by private contract (e.g. service level agreements) or by public regulation.

The security and privacy of online services is also linked to resilience since both withstanding and recovery of disruptions should not compromise the security

¹³ <https://www.bcs.org/media/czwjt34u/availability-the-nis-framework.pdf>

¹⁴ As ³ above

and privacy of online services. Again, assurance of this feature of resilience becomes a matter for private contract or public regulation.

Conclusion

We have described what a utility service is and why and how it is regulated. We have described the characteristics of digital services that suggest the need for regulation with some qualitative differences from other utilities.

One outcome could be that digital service suppliers would set up explicit commitments between the users (consumers of the service) and the supplier (the service provider). The goal would be to have Digital Services that have agreed Service Level Agreements, that are realistic, that support individuals and organisations depending on the service, that can be delivered by the supplier, and can be enforced by the regulator.

Appendix A: Availability & Resilience Definitions

The ITLF Availability working group (AWG) define availability and resilience as below so that there is consistent use. Although these terms are often used interchangeably the following distinguishes them:

- Availability refers to the measure of how consistently a system is operational and accessible, high availability aims to minimize downtime and ensure continuous operation;
- Resiliency describes the system's ability to withstand and recover from disruptions, including failures and attacks; it focuses on the speed and effectiveness of response and recovery after a disruption or outage.

Improved availability often depends on increased resilience.

Appendix B: Where We Started From- a discussion on

Why is IT a de facto utility?

IT is a utility because society needs it to be working correctly 24/7 to conduct personal and business activities. If IT fails, whether through aging infrastructure, unintended software consequences, human error or malicious activity, people and the economy are harmed.

Society expects IT to be available 24/7, working at a consistently high level of reliability, safety, security, and access to redress for when things go wrong. Society expects IT to be owned, managed, run and supported by people with the correct level of skills and experience.

Society expects the organisation and people who provide IT products and services to be doing so for the public good as much as for their bottom line. To keep the balance between serving the public good and obtaining profit, we require regulation and standards on performance, safety, security and customer service, with independent oversight (for established UK utilities, this is an ombudsman).

To achieve consistently high services, we must employ people with the right skills and experience. These are achieved via the right training and practices, which must be refreshed via ongoing education (CPD/Es) to ensure skills are kept-up-to-date within a fast moving and increasingly complex tech world. There are many inter-dependencies between utilities. For example, IT needs electricity and all utilities rely on IT to provide their own services.