Hewlett Packard Enterprise

Paving the way for the European Data Economy: HPE's vision for data sovereignty and decentralized cloud federations in the EU

Position Paper

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Executive summary

Hewlett Packard Enterprise (HPE) helps organizations across all sectors to develop new business models, to create new shared data spaces and increase operational performance by unlocking value from data, regardless of where it is stored. To that end, HPE provides technology solutions that enable a consistent and seamless experience across all clouds and edges, based on an edge-to-cloud platform, delivered as a service.

Smart factories and cars, smart cities and devices create an unprecedented amount of data. The future of digitization and data management is decentralized – at the "edge". The EU has everything it needs to succeed in the next wave of B2B digitization, most importantly a sophisticated knowledge economy and a strong industrial base. In order to build a data economy where data owners truly benefit from their own data and monetize it, the European Commission shall help Europe's governments, businesses and organisations prepare for this decentralised age by advancing policies that offer choice and enable data sovereignty.

HPE welcomes the European Commission's new Data Strategy announced in February 2020 and the EU's ambition to benefit from the value of the industrial data it is generating.

There are two crucial aspects to be taken into account while building a decentralized cloud federation:

1. **Data sovereignty:** Alongside developing new governance structures for the Common European Data Spaces, the Commission should also place emphasis on new infrastructure and digital supply models for data monetization in decentralized environments. While political initiatives to improve data interoperability, or fostering locally owned technology and IP in areas like artificial intelligence (AI) or processor technology are strategically important in the long run, we believe the more urgent issue is how companies leverage such technologies for greater **data ownership** and easier **data monetisation**. The European Union needs to ensure that data owners are given a choice and that they are empowered with the right tools to share and benefit from the data they generate.

2. **Sustainable business and agile procurement models**: we encourage the European Commission to look at ways to promote the use of consumption-based IT, and more generally, favouring "Everything-as-a-Service" (XaaS) models which make procurement of digital infrastructure less costly, less energy consuming, while providing flexible capacity.

I. Building decentralised cloud environments

The shift towards decentralised environements

Over the next 10 years, the infrastructures that underpin our economy will progressively decentralise. The catalyst for this change is industrial data. By 2020, 30 billion intelligent sensors will be sold worldwide each year.[1] They go into solar and wind farms, vehicles, or production machines, generating data masses everywhere. Physical elements become the digital "platforms" of the 21st century. This data is mostly under the control of the enterprises that build and run these infrastructures and it has enormous value. As an example, the data of connected vehicles has been forecasted to have a monetary value of €660 billion by 2030 ($750bn).[2] This data, along with machine learning algorithms, forms the basis for so-called "edge-to-cloud" environments that integrate data and processes from the field level to the enterprise level. **Gartner estimates that more than 50 percent of enterprise data will be generated and processed outside traditional data centers or clouds by 2022.[3]**

As data volumes keep growing exponentially, the traditional centralized cloud model is pushed to its limits. This is why HPE supports the vision of the European Union to establish a federation of decentralized clouds. HPE has been working on a decentralized cloud model since almost a decade. One example is **Cloud28+**, which is built on Contrail, an ICT research project co-funded by the European Commission, with the objective to create a federation of European clouds.[4] It consists in a digital platform which gathers cloud offerings from hundreds of local-grown European cloud players to help them gain visibility to potential customers and so reach new markets.

Everything will become a platform: network effects in a decentralized environment

Businesses must act quickly because the next few years will determine winners and losers in the decentralized age of digitization. They must establish a foundation that enables them to capitalize on digitization opportunities in the short term without becoming dependent on individual digital platforms, and while remaining open and compatible with upcoming architectures like Gaia-X or cloudless computing. Although the view of network effects has become more nuanced in recent years,[5] they still are one of the key levers for creating competitive advantage, switching costs and customer lock-in in the digital economy.[6] Artificial intelligence (AI), for example, becomes better, the more data it is fed. The same effect applies to digital marketplaces: the more suppliers, the more buyers, and vice versa.

[1] IC Insights (May 2019), Sensors/Actuators Reach Record Sales on Slower Growth.
[2] McKinsey (March 2018), Accelerating the car data monetization journey in HPE White Paper (2020).
[3] Gartner (August 2018), How Edge Computing Redefines Infrastructure.
[4] The Contrail project 2010-2013 formed part of the European Commission's Seventh Framework Programme (FP7).
[5] Catherine Tucker (2018), Network Effects and Market Power: What Have We Learned in the Last Decade?, Antitrust.
[6] Dan Prud'homme (2019), How digital businesses can leverage the high cost for consumers to switch platforms, London School of Economics Business Review.

In that regard, today's leading centralized digital platforms have significant advantages. The question is how individual companies can leverage network effects without becoming overly dependent on these platforms. It can be stated that the degree of data sovereignty of a company to a large extent depends on its degree of control of the network effect.

The answer is that companies should establish network effects that are under their own control, i.e. establish own platforms. We will explain this using data network effects in industrial environments as an example.

Industrial data holds significant opportunity to create competitive advantage with network effects due to the high importance of real-time data in industrial processes. Real-time data network effects can create above-average defensibility of competitive advantage.[7]

However, when more than 50 percent of data is created at the edge, as Gartner predicts, there are two contrary requirements. On the one hand, the majority of that data must be processed close to the data source because in many cases it's too slow and too expensive to send them to a remote data center. On the other hand, companies must find ways to aggregate the distributed data because that's the prerequisite for leveraging their "swarm intelligence" to continuously improve the analytic models and algorithms which control processes at the edge.

A way of achieving both goals, while avoiding dependency on one centralized external platform, is to **establish an own** decentralized data fabric, or **data platform. This platform seamlessly supports the whole cycle from data acquisition to aggregation, analysis and action in an environment that can be distributed across numerous sites, plants, data centers and clouds.**

With today's technologies it is possible to establish a unified access to globally distributed data via a so-called global namespace. It is also possible to grant external parties a controlled and secure access to selected data via multi-tenancy structures. These technologies include, among others, data pipelines, datataps, data lakes and stream analytics. And based on **container technology**, such a data fabric can be distributed across manufacturing plants, logistics centers, data centers and public clouds, while at the same time enabling a unified operation and management. The data stays where it is but can be analyzed in the aggregate.

Container technology designed to support both cloud-native and non-cloud-native applications using 100 percent open source Kubernetes – running on bare-metal or virtual machines (VMs), in the data center, on any public cloud, or at the edge. It allows data to be decoupled from applications, middleware, and hardware. As a result, applications can be seamlessly transitioned from one environment to another.

In this way companies can establish an own two-sided market – structurally similar to those of external digital platforms – where distributed machines, vehicles or plants feed data into the fabric, and in exchange they receive enhanced algorithms and analytic models. Such a platform can both be applied to internal and external data customers and data suppliers.

As a result, **companies become less dependent on external centralized platforms because they achieve internal and external network effects via a decentralized architecture.** External platforms remain vital resources because they provide excellent tools and data aggregation – but they are no longer the spider in the web. They become players among others which companies can link to their own network in a controlled and efficient way. **Interconnection and interaction takes place in a federal or peer-to-peer way between equal parties.**

[7] James Currier (2019), What Makes Data Valuable: The Truth About Data Network Effects, NFX.

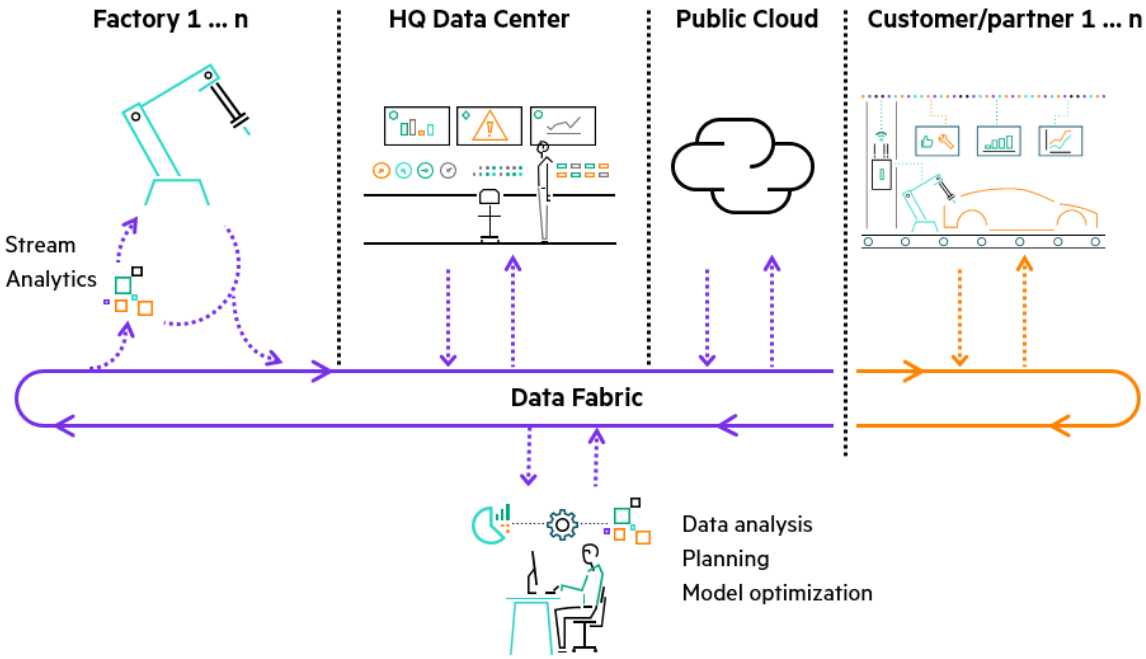

Figure 2: A data fabric can be distributed across manufacturing plants, data centers and public clouds, while at the same time enabling a unified access to data. The data stays where it is but can be analyzed in the aggregate.

Gaia-X: a promising example of decentralised cloud infrastructure

Gaia-X is a promising example of new decentralised environments. The Gaia-X model, which HPE has been contributing to in collaboration with the German government, is a blueprint for a decentralised cloud federation, rightfully described by Germany's Economy Minister, Peter Altmaier, as "nothing less than a European moon-shot in digital policy". By creating a decentralised data infrastructure to connect consumers, service-providers, and data, across edges, data centres and clouds, the approach is in step with the shift from a centralized to a decentralised digital world. Gaia-X also gives an answer to a crucial question of the upcoming digital era: how to create network effects in a decentralised world where not middlemen, but all citizens can be digitally sovereign, helping organisations and individuals regain the freedom of the Internet without losing the benefits of the network effect.

II. Data ownership and monetisation

Decentralized cloud eco-systems will help achieve data sovereignty.

For businesses and organisations in Europe, it is crucial that they be able to not only control their data, but also control its monetization, i.e. the data-driven business models that drive revenue and margin. **This does not mean confusing sovereignty with self-sufficiency.** The key point is not who runs the IT, or if technologies are made or bought – but rather the **bargaining power of the digital suppliers** especially in markets with high consolidation, such as the public cloud market.

One way of helping organisations monetise their data more easily is through **blockchain-based data monetization platforms**. These platforms leverage a decentralized no-middleman approach that enables enterprise actors to share their data and activate new digital services. As an example, these platforms can be extremely effective in the automotive

sector. HPE partnered with Continental to create a platform that will help car manufacturers monetize their data and differentiate their brands. The challenge for car manufacturers is that they only have access to the data of a portion of their own fleet which leads to poor accuracy of existing driver-assistance services and inhibits the deployment of new mobility services. This problem could be solved if car manufacturers shared the data with each other – but, they hardly ever do so because they consider vehicle data to be their intellectual property. That is also the reason why manufactures, so far, have not leveraged any cloud platforms to share data. Based on blockchain technology, the platform we are deploying provides the necessary security, transparency, and efficiency to overcome these barriers of sharing vehicle data, thereby **enabling the organisation to both retain control over their data and monetise it effectively.**

III. Sustainability: A green future for computing

Researchers estimate that ICT manufacturing and use consumes nearly 10% of the world's electricity generation. Yet 30% of servers in large data centers are draining power while doing no useful work, translating into at least $30bn in wasted data center capital worldwide.[8] [9] The Institute of Electrical and Electronic Engineers (IEEE) estimates that, due to the intra-data center network and large-size cooling, partly distributed and centralised architectures consume between 14% and 25% more than a completely distributed architecture, respectively.[10]

When the EU is redesigning its IT eco-systems, there is a unique opportunity to put sustainability at its core.

Sustainability should be a key focus at hardware level, but we should also re-think IT provisioning business models to secure a more sustainable approach.

At hardware level, HPE is strongly committed to **energy efficiency,** with a goal to increase the energy performance of its product portfolio 30-fold by 2025 compared to 2015 levels. The achievement of this goal includes investing in R&D into new technologies, such as photonics, which has been identified as one of the European Commission's six key enabling technologies of the 21st century. We are already testing beta-versions in some of our most innovative customers' IT premises in Europe.

Circular economy and hardware refurbishing: When it comes to retiring legacy assets, HPE Asset Upcycling Services enables enterprises to set and meet goals for IT asset retirement, renewal, and remarketing—regardless of brand manufacturer. Our Technology Renewal Centers are the largest of their kind globally, and will take back not only HPE equipment but also any IT equipment, from servers and networking to desktops and printers—a rare industry practice. These second-hand products have become a major supplier of IT assets during the onset of COVID-19, as supply chains were disrupted and the demand for connectivity increased. Last year alone HPE processed 4 million assets, remarketing 88% of them, and recycling the other 12% in a secure, environmentally responsible way.[11]

New business models: consumption based IT will be a game changer in IT sustainability. **Agile consumption-based charging models have several advantages:**

- They enable the speed and flexibility of the public cloud while retaining confidence and control of the apps and data.
- They are consumption-based so the organisations can get the service they need and pay for what they use without a significant capital investment.

[8] Morley, Widdicks and Hazas (April, 2018) "Digitalisation, energy and data demand: The impact of Internet traffic on overall and peak electricity consumption", Energy Research & Social Science.
[9] Taylor and Koomey (March, 2017), "Second Comatose Server Report", Anthesis.
[10] Ahvar, Orgerie and Lébre (March, 2018) "Estimating Energy Consumption of Cloud, Fog and Edge Computing Infrastructures," IEEE.
[11] HPE Circular Economy: https://www.hpe.com/us/en/living-progress/circular-economy.html.

- This is financially and environmentally efficient, eliminating the wasted infrastructure and processing capacity inherent in most customer-owned IT portfolios. This means organizations can redeploy that capital and IT resources in the pursuit of its strategic goals.

Consumption based offerings enable customers to bring existing equipment to the highest levels of utilization and to avoid depreciating equipment that's idling. The delivery of hardware, software, and expertise in a pay-per-use model leads to significant resource and energy efficiencies by avoiding the existing overprovisioning for infrastructure while eliminating expenses for technology refreshes. That means less equipment to manage; less space used to house and manage equipment; and reducing energy-intensive tasks like cooling server rooms. A survey of 500 IT decision-makers and data from the Cloud Price Index found that enterprise data centers are overprovisioning by 59% on compute and 48% on storage, thereby underlining the benefits of XaaS as the consumption model that can solve such unsustainable practices.[12] In addition, metering and monitoring applications allow organisations to track and adjust their usage, giving usage insights to customers often for the very first time. This helps customers meet their own environmental sustainability targets, while getting the latest technologies to support core business activities and innovation.

Conclusion

We can shape an architecture of the digital world where each and every one has sovereignty over its data. This is the logical next step in the evolution of the digital world. The history of IT has been, among others, a sequence of gradual liberation of applications from the platforms they are running on – from the hardware, the operating system and finally from the entire operating environment. What remains is the dependency on the respective cloud platform.

Through the design of a different cloud eco-system in Europe – one that rests on a decentralised model and privileges data ownership, monetisation and sustainability, it will be possible to bring better value to our European economies, making them greener while ensuring a safer and more sovereign relationship to our data.

[12] HPE and Intel (2016) "Best of Both Worlds: Can Enterprises Achieve Both Scalability and Control When it Comes to Cloud?", 451 Research.