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Special Report: The Real Economic Value of Cloud

Countries worldwide are recognizing the centrality of cloud computing in their national economies. For example, Germany has established an “Industrie 4.0” Internet-of-Things national initiative that depends upon the computational power and storage capacity of the cloud. As adoption proliferates across an economy, studies predict long-term effects such as reducing unemployment, improving Gross Domestic Product, and fostering a greener economy. Countries seeking to derive the maximum benefit from cloud adoption will be those that best understand *the power of cloud as an enabling resource*.¹

The Software-Driven Economy

The global economy is increasingly dependent on a new generation of data-driven activity tied directly to mobile devices, Big Data analytics, the Internet-of-Things, robotics, and cyber-physical systems. This future economy will run on *software*, and the high-value economies of the future will be those that invest today in the intellectual and technological resources for software engineering and development. Cloud adoption is a foundational step in this process.

- Software is fast becoming an indispensable resource for the global economy, and not just for Internet-based companies such as Facebook, Amazon, Google, Netflix, etc. Today, traditional high-technology manufacturers such as General Electric, IBM, BMW, Mercedes Benz, Ford, Boeing, and John Deere, are all tying their futures to *innovations in software*. These companies are recognizing that the future will be built around software-driven, cloud-enabled technologies such as cyber-physical systems and the Internet-of-Things.
- Cloud software is transforming many parts of the traditional “good and services” economy, and is beginning to account for a significant percentage of total employment. Economies that invest in software will be those best postured for success, and cloud computing is the best resource available to support software development, experimentation and innovation.

Jobs in the Software Engineering Ecosystem

Software engineering remains among the most sought-after career fields, and the range of job categories that require these skills continue to diversify. Software skills are now core requirements for emerging jobs fields such data analytics, predictive and prescriptive analytics, process management, data governance and the Internet of Things. New areas such as connected cars, data visualization and artificial intelligence have opened even more career paths. Multiple studies report how software engineering as a job category continues to grow and has proven largely recession-proof. All forecasts indicate that software engineering will remain a high-value, high-demand career field for the foreseeable future.

¹ Please contact IAT for additional research findings on employment prospects in the software economy and the data center economy. Source references for this report on file at IAT.

- The 2016 World Economic Forum survey “The Future of Jobs” paints an optimistic picture of job creation linked to Big Data analytics, mobile Internet, and the Internet-of-Things. Much of this will be driven by young demographics, the rising middle classes in emerging markets, and the rising economic power and aspirations of women.
- The United States workforce alone has over a million software engineer jobs, and forecasts predict an additional 200,000 new positions by 2022. This 22% increase represents a more rapid and consistent rate of growth than the rest of the economy. Furthermore, some commentators suggest that, as software proliferates throughout the economy, coding and software development is becoming a more stable, middle-class, even “blue-collar” career path, not necessarily requiring a 4-year computer science degree.
- Software engineers remain highly sought-after across the European job market, especially in the UK, Ireland and Germany. In many advanced European economies, the job market is expanding faster than national educational systems can support. Likewise, other countries have talent surpluses seeking job markets.

Investment in innovation opens up national economies to entirely new career fields. Cloud and software engineering lays the foundation for a wide range of associated career paths in the data analysis/science, cybersecurity, and business intelligence. Each of these career fields are enjoying tremendous demand worldwide, especially in forward-looking economies. *Mobilizing a nation towards a digital economy requires the vision and the courage to look forward and embrace these trends, while resisting the outmoded job-creating models of previous eras.*

The Economic Value of Data Centers

Data centers are the foundational physical infrastructure of the digital economy. However, the long-term economic value derived from the data center lies *not in its physical construction and operation, but rather in the computational and storage resources it provides.*

- Cyber-physical systems, the Internet-of-Things, and mass data analytics are simply not possible without the *computational and storage capacity* of the modern multi-tenant data center. These are the critical factors for economic growth and job creation.
- Software-defined networks and ultimately software-defined data centers will bring increasingly new levels of sophistication and efficiency for control and management of these massive computational resources. As Dr. Robert B. Cohen of the Economic Strategy Institute has noted, “if cloud services are part of a next-generation, application-driven, business-process-engine-managed ecosystem of virtualized storage and networking, data centers might create more value by developing new applications”.

Data Center Employment

However, data centers *as actual worksites* are not long-term creators of high-value jobs. After the temporary work of physical site construction, the facility itself employs a minimal staff of

technicians responsible for physical security, maintenance and troubleshooting, and crisis management.

- Despite the massive expansion of cloud computing—and with it the construction of new data centers—the growth of employment *in* data centers has seen a much less significant rate of increase. In fact, the growth rate of employment across the data center market has been declining since early 2012.
- New technologies such as virtualization, robotics and software-defined systems are prompting a massive consolidation of proprietary data centers into large, multi-tenant facilities. Accompanying this trend is a consolidation of the data center workforce. According to some companies, nearly one third of data center jobs will eventually be performed by robots.

Conclusion

Public authorities interested in the job-creating potential of cloud computing should *recognize cloud as an enabling resource, rather than an industrial-era jobsite*. Cloud services are likely to drive benefits for the broader economy, especially for start-ups and SMEs which are the primary drivers of new employment in today's economy.

In a global economy driven by software, cloud provides the resources for software development and engineering, allowing firms to work more efficiently and concentrate on product rather than overhead. Enterprise cloud adopters today are likely to gain more from investments in cloud services that facilitate innovation and productivity.