

HOW TO TAKE ADVANTAGE OF CLOUD COMPUTING FOR INDUSTRIE 4.0 AND ENTERPRISE 4.0

Industrie 4.0 is characterised by increased production flexibility and by the union, combining and harmonisation of key technologies designed to provide the required simplicity, connectivity and openness for a new generation of Manufacturing plants. The orchestration of production takes place in real time, taking into account the actual availability of all the resources involved. The progressive adoption of Machine Learning methods improves the flow of materials through the manufacturing process and reduces to a minimum the downtime of production equipment. In this scenario, the CLOUD becomes an enabler and an essential factor that helps enterprises to complete the digital transformation process quickly, with the guidance and support of specialised technological players like Red Reply, the Reply Group company specialising in technology and process consulting services on the Oracle Cloud platform.

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CLOUD AND INDUSTRIE 4.0

The relationship between the Cloud and Industrie 4.0 is a winning combination. While it certainly needed time to mature and to begin to bear fruit, this key partnership now allows companies to radically and deeply rethink their full range of digitisation processes. All this with more flexibility across the board, from the ability to respond to market demands, to cost control and a true and complete ROI management.



Industrie 4.0 refers to that process of digitisation typical of the manufacturing sector, which completely distorts the value chain, changing not only the way companies produce, but the very nature of the organisations themselves. The focal point of companies that carry out their business operations integrating the Internet of Things into their processes, is an automated management of information, associated with the widespread use of digital technologies. In other words, a genuine "technological intelligence", no longer linked solely to machinery and equipment, but ubiquitous and pervasive in nature and made possible by the Cloud.

The levels of monitoring and control are in turn multiplied, enabling companies to ensure compliance with regulatory and quality control requirements more easily, while at the same time reducing operating costs. Artificial intelligence (AI), advanced sensor technology, 3D printing, augmented reality and an increasingly closer collaboration among Supply Chain players, synchronising production timeframes and methods: these are the most common digital technologies in Smart Factories.

INDUSTRIE 4.0: HOW TO OPTIMISE INDUSTRIAL PROCESSES WITH CLOUD COMPUTING

The Cloud is the connective tissue of Industrie 4.0, the key element that makes it possible to develop a production strategy that is innovative, more effective and efficient by leveraging sensors, artificial intelligence and robotics.

And companies have understood this, at least according to "Cloud" research: Opening Up the Road to Industry 4.0" research, carried out by Oracle and Intel on a sample of 1,200 managers of medium and large manufacturing companies based in the EMEA region (Europe, Middle East and Africa). In fact, according to the findings, 6 companies out of 10 feel it is "necessary" to adopt an enterprise Cloud infrastructure in order to capitalise as well as possible on investments in innovation, primarily focused on Robotics (62%) and AI (60%). The Cloud is therefore a genuine accelerator of digital transformation in manufacturing companies. The Cloud provides companies with the computing power needed to identify and exploit new business opportunities to the fullest,

extrapolating the relevant information within the myriad of data captured. If it is indeed true that AI and robotics represent the key assets of digital transformation in factories, Big Data and analytics are the tools on which to base both the strategic and the tactical decisions. But the 4.0 suffix makes it clear that the most important innovation for CIOs and business line managers is the ways the technologies are used, which today, thanks to the new Cloud-related pay-per-use and as-a-service formulas, are within the reach of any organisation, big or small. One of the keys to the success of Industrie 4.0 and of smart manufacturing is the possibility, even for small to medium-sized companies, to choose flexible deployment models for largescale innovations, with the guarantee of a significant competitive edge. With Cloud Computing, companies will always be able to choose the best technological innovations, while respecting budget constraints, transforming initial investments (i.e. CapEx, capital expenditures) into recurring costs and spread over the reference time horizon (i.e. OpEx, operating expenditure), to the benefit of ROI (return on investment).

HOW TO CALCULATE ROI FOR CLOUD PROJECTS

First of all, it should be noted that the Cloud is primarily identifiable by a few key technical characteristics:

- The certainty of performance, regardless of whether the capacity was initially designed for one, one hundred or one thousand users, with the guarantee of predetermined SLAs (Service Level Agreements).
- The abstraction of the infrastructure, so that applications are not blocked within specific devices or media and can be accessed at any time and anywhere.
- The "pay-as-you-go" nature of the IT service, based on which companies pay only for the services they actually use, with initial investment costs which may be minimal (to start using a Cloud service, an Internet connection and a device are sufficient).
- Vertical scalability, with an almost instant and on-demand guarantee of availability of resources. Generally, no forecast or preventive estimate of consumption is required.

These characteristics translate into a series of concrete benefits for companies:

- Increased business flexibility and agility - The Cloud makes it possible to scale computing power, as well as network and storage capacity, with ease, guaranteeing that infrastructural elasticity which allows the company to cope with sudden peaks in activity (such as particularly aggressive marketing campaigns or, at times, management of the seasonal nature of the offer, or in the context of Cloud manufacturing, management of the digitisation of production in productionintensive situations, etc.).
- Increased operational efficiency Zero deployment time, with a significant reduction in operational activities and infrastructure maintenance.
- Shorter innovation cycles Constant updating and continuous improvement of services related to the Cloud platforms, with the guarantee of maximum simplification of the IT infrastructure.
- Cost reduction The reduction of IT infrastructure management costs (power, UPS devices, connectivity, airconditioning, staff, etc.) and simplified maintenance.

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The models provided by Cloud Providers generally take into consideration only KPIs (Key Performance Indicators) regarding the use of IT resources (such as the possible uptime of systems) and the available IT capacity (but also the bandwidth available, CPU cycles, available storage capacity, etc.). Corporate ROI evaluation models, on the other hand, refer solely to the reduction in operating costs or the increased availability of IT resources, often without making any reference to the direct impact of a Cloud project on the business.

The experience and applicability of the Cloud in various industrial sectors and to address multiple needs has led, over time, to the definition of 8 indicators which, as a whole, help companies understand the current and future needs of their LOBs (lines of business) and IT services, therefore allowing them to estimate the potential of Cloud projects more accurately. The 8 indicators are:

- Increase in the speed and rate of innovation: adoption and dismantling costs are lower in Cloud environments compared to the on-premise scenario. Moreover, the Cloud entails additional benefits, reducing the time and effort associated with decision-making activities and their translation into new products and/or offers.
- 2. Optimisation of TCO (Total Cost of Ownership): users can select, configure and run infrastructure, platforms and applications that are "tailor-made" to the needs of their business activities/business unit.
- 3. Rapid provisioning of resources: compressed from weeks to just a few hours.
- 4. Increased control over costs and increased margins: the certainty of infrastructure and IT service costs enables companies to redirect the savings obtained towards activities related to the core business, such as the development of new products/ services.
- 5. Dynamic use of resources: Cloud services are designed to be highly granular, so as to meet the specific needs of end users.
- 6. Sustainability and privacy: the Cloud makes it easier to comply with Green IT regulations and data protection standards.
- Optimisation of the IT function: with the optimal use of the IT capacity, without running the risk of redundancies.
- 8. Skills: with access to the most specific and innovative expertise and IT solutions provided by Cloud providers.



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These indicators take on an even more interesting role if evaluated in light of the tax savings introduced with the Calenda Plan in its original version (Industrie 4.0 Plan) and in its most recent version (Enterprise 4.0), which make it clear that the time has come for Italian companies to invest in digitising their businesses by leveraging the Cloud.

CLOUD MANUFACTURING: WHAT IT IS AND WHY IT FAVOURS THE DIGITAL TRANSFORMATION OF THE FACTORY

Today, many manufacturing companies are leaning towards new organisational and process-related paradigms, with a focus on collaboration along the entire supply chain. The idea is to increase competitiveness in national and international contexts, no longer operating as individual entities, but as elements of a broader and more and organic ecosystem, optimising all production and distributionrelated activities to achieve greater process efficiency.



Cloud Manufacturing (CMfg) is a business model that is being consolidated. It enables organisations to virtualise production resources (software, machines, etc.) and to offer them as a callable service, easily configurable and consumable via the Internet, using Cloud Computing. Based on this model, production infrastructure and maintenance costs are allocated across the entire supply chain, allowing individual players along the Supply Chain to benefit from increased productive capacity (and greater flexibility) and cost reduction.

Cloud Manufacturing incorporates a number of key technologies such as the Industrial IoT (IIoT), cyber-physical systems (CPS), Manufacturing Data Management solutions as well as, of course, the Cloud, to enable a new type of production, defined as Manufacturing-as-a-Service (MaaS).

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Companies can already begin to envision production not as a process, but as a genuine service: in the not too distant future, it will be possible to use virtual plants (simple 3D printers or new generation numerical control machines), located strategically close to the target consumers (thereby reducing investments in inventory) and reducing the production capacity to capitalise on sales results quickly and to adapt to changing market conditions with flexibility. The end-to-end process can easily be managed and monitored in the Cloud.

Cloud Manufacturing is a new frontier of Cloud Computing, on a par with Fog Computing or Edge Computing.

FOG OR EDGE COMPUTING: WHAT IT IS AND WHY IT IS IMPORTANT FOR THE INDUSTRIAL IOT

The shop floor and the assembly line are becoming increasingly more connected. The number of devices, such as 3D cameras, new-generation numerical control machines and various kinds of sensors that generate data in real time to ensure a more efficient productive process, are actively increasing. Internet networks are increasingly more congested and it is impossible to reprocess salient information in a short period of time.

This scenario is forcing plant and IT managers to rethink the management architectures related to data coming from plants. Fog Computing, or Edge Computing, is a new approach that facilitates a reduction in the use of data bandwidth through an initial screening of records received from the sensors, which are analysed where they are able to produce the maximum benefit and not, as was common in the past, in the data centre.

Cloud computing, sensors and intelligent objects, 5G wireless networks and M2M (Machine-to-Machine) connections are some of the enabling technologies of the Edge Computing model, which make it possible to physically distribute computing power or storage by intervening between

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the Cloud and end users, providing analytical applications with files and resources typically accessible only through a network connection.

Modern companies do not limit themselves to collecting "random" data to ensure compliance with quality standards. They rely instead on the use of sensors and intelligent machines to collect information on all the individual phases and processes of production, to immediately understand the causes of errors or inefficiencies, stimulating a production process characterised by higher quality and reducing waste and costs. Inefficiencies can be addressed only if they are promptly identified and duly documented. There is a need, therefore, to map all production processes and compare the data obtained through this approach with historical data collected in the past. The ability to carry out realtime analysis makes it possible to take immediate action on the production chain, dispatching alarms and alerts to specific users or triggering automated actions (such as shutting down specific machinery) when defects or inconsistencies are identified in the production process.

SUPER AND HYPER DEPRECIATION, THE ROLE OF THE CLOUD IN THE CALENDA PLAN

It is important to evaluate carefully the relationship between Cloud Computing and the specifications contained in the Calenda Plan, both in its original Industry 4.0 version (which entered into force on 1st January 2017) and above all,



within the scope of the renewed Enterprise 4.0 Plan, approved with the 2018 Budget Law.

The Plan, in fact, names Cloud Computing as one of 9 key enabling technologies of Industrie 4.0. The Cloud, however, also represents the enabling infrastructure par excellence for all other facets of the IoT in the manufacturing sector, from additive production to simulation technologies, from the Industrial Internet of Things to analytics and Big Data.

The Calenda Plan, designed to promote the evolution of the Italian manufacturing industry with a series of targeted tax incentives, offers opportunities for businesses focused on development through innovation, which should be carefully examined and evaluated. Certainly, the most important aspects consist in the concepts of Hyper Depreciation – an increase of 150% in the purchase cost of 4.0 goods and technologies – and Super Depreciation - an increase of 40%, resulting in a repayment of 140% of the fiscally recognised cost of new capital goods. Starting with a hypothetical investment of 1 million euros, we obtain net tax savings of 336,000 euros through Super Depreciation and 600,000 euros thanks to Hyper Depreciation.

The Industrie 4.0 Plan also introduced software (together with system integration

systems and services, platforms and applications) among the group of assets which can take advantage of Super Depreciation. Thus, now is precisely the time to invest in the modernisation of technologies used to support productive activities. In 2016, the focus of the Plan was on capital goods. Today, however, the Italian Government aims to boost investment in "soft" technologies and services (such as system integration and Cloud Computing) capable of carrying companies towards maximum operational efficiency and new levels of competitiveness.



FROM INDUSTRIE 4.0 TO ENTERPRISE 4.0, INCENTIVES FOR EVERYONE (ESPECIALLY SMES)

In late October, Minister Carlo Calenda announced an action worth 10 billion euros focused on Enterprise 4.0, in the form of tax incentives and direct investments designed to stimulate the digitisation and

growth of Italian companies. The focus is no longer only on the manufacturing sector, it is now on the Italian productive fabric in general, with an eye towards the specific services likely to encourage a

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pervading digitisation. The 2018 Budget Law continues the incentives in tangible assets (machinery) and 4.0 systems, with a series of adjustments: Super Depreciation sees a reduction to 130% (it was previously set at 140% in the original Plan) while Hyper Depreciation is confirmed at 250% for 4.0 technologies and depreciation applicable to software purchase costs (at 140%). The Enterprise 4.0 Plan extends the benefits of subsidised loans for capital goods available to micro, small and medium-sized enterprises (the New Sabatini Law), with an increase (from 20% last year to a current 30%) in the share of resources reserved for investments in 4.0 technologies: Cloud, Big Data, cybersecurity, augmented reality, etc.

CLOUD COMPUTING TO SUPPORT 4.0 ENTERPRISE STRATEGIES

Industrial plant operators are often reluctant to move their data to the Cloud. However, today's competitive climate is forcing companies to aggregate and integrate data from various plants and facilities in order to improve the monitoring of processes, ensuring a more or less relevant competitive edge over the enterprises that remain anchored to more traditional activity management models. Production experts are therefore encouraged to select the best of both worlds - on-premise and in the Cloud collaborating closely with partners capable of hosting their data and applications in the Cloud.

For large enterprises dealing with the relocation of production plants and sites, the monitoring of processes in

the Cloud, within the scope of carefully defined quality parameters, is certainly an interesting aspect. But the potential of Cloud Computing is expressed to the maximum in SMEs, which will finally have access to a flexible and on-demand processing and storage capacity, without having to incur the costs of establishing an internal data centre – a wired, contingent and protected space and therefore rather costly.



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INDUSTRIAL IOT, ENTERPRISE 4.0 AND CLOUD COMPUTING: THE VALUE OF CONSULTING AND SYSTEM INTEGRATION

Relying on a strong partner with proven consulting capabilities allows CIOs and LOB managers to address these challenges with awareness and a sense of security, immediately starting to reap the benefits offered by the Cloud. Partners such as Red Reply, the Reply Group company specialised in consulting services and the design, implementation and management of solutions based on the Oracle IaaS (Infrastructure-as-a-Service) and PaaS (Platform-as-a-Service) platforms.

Red Reply offers Cloud advisory and assessment services designed to make it possible to evaluate, in consultation with the customer, the optimal strategies, the plans and the ROI of every digital transformation project. One of the key advantages offered by Red Reply is therefore the support that the company provides in the reverse engineering of applications on the Cloud platform, as well as in ensuring a fluid migrating path to the Cloud (the so-called "Cloud Journey"). All this, with the help of "firepower" derived from the collaboration with Oracle, thanks to Red Reply's standing as the only Italian partner certified as a MSP (Managed Service Provider) and in the management of Cloud services provided by the Oracle platforms.

Thanks to Red Reply and Oracle, companies can leverage the equivalent of hundreds and thousands of CPUs, storing terabytes of data made available by the Oracle Cloud platform in just a few minutes, while also taking advantage of a range of additional services including Identity Management, Security, Analytics, Database and the Enterprise & Integration Service Bus.



CLOUD READY, WITH A 30% REDUCTION IN RECURRING COSTS

Red Reply has developed a migration model that allows customers to take advantage of a 30% saving in recurring costs.

Thanks to the skills and expertise acquired in the field, to continuing certification courses, to participation in Beta Programmes and to co-development initiatives with Oracle, Red Reply's team of Cloud experts are the most qualified professionals to accompany enterprises in the processes of transformation of information systems based on the Oracle technology.

The benefits are tangible: the migration of cloud-ready application workloads to Oracle Cloud enables companies to cut fixed costs related to the availability of proprietary data centres, recurring costs related to infrastructure, software and platforms, as well as the costs of operational management and maintenance, with an average saving of 30%.

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RED REPLY is the Reply Group company specialised in consulting services and the design and implementation of solutions based on Oracle technology (laaS and PaaS). Red Reply is pursuing a constant innovation process through ongoing certification, participation in the Beta Program and in co-development initiatives with Oracle Corporation, in order to guarantee its customers expert support. Thanks to the expertise it has acquired, Red Reply supports its customers through the various stages of the information systems transformation process, from the design to the implementation of innovative solutions based on the Oracle technology.