Growing a Digital Mindset in the Lime Industry with an IIoT Platform Based on Social Media Communication Principles

Author:

Carlo Cella
Chief Executive Officer
QualiCal International Srl
carlo.cella@qualical.com

INTRODUCTION

QualiCal is an engineering company operating in the lime industry since 1996. The lime industry is an old, niche and close domain with relatively low margins, where innovation on proven technologies faces many obstacles, and where new players with their new proposal have many challenge to overcome to establish their role into the market. Consider that we are speaking of improvement on assets that have a long-lifespan and must be operated on continuous basis for producing a product, namely "lime", that is a low cost-high volume commodity. [1]

The market has become more and more competitive in the latest years, in principal, due to the fall in demand related to the economic global crisis of steel merged with the crisis related to the oil glut. Therefore, the most efficient technology is needed to reduce operating expenses by avoiding unplanned downtimes.

The challenge has been to be competitive by applying an alternative business model. A new business model can distinguish the company from those companies who have been on the market longer and have not adapted to the new industrial revolution.

QualiCal provides technological solutions, engineering services and manufacturing equipment and plants for the lime domain.

When we started our business, many other companies had been in the market for decades, offering products and services in the lime sector. They had already received numerous and qualified references from all over the world. The challenge was clear from the beginning: we had to be competitive and the only way was to be different.

Figure 1 Gian Mario Cella, QualiCal Founder and President

In fact, only an alternative product, service - or better - an alternative business model would have given a competitive advantage to us compared to the other, well established players.

"Digitalization is transforming the ways we do business, interact with our customers and build new business models, products and services. Our objective is to help our customers to improve their operational efficiency, reduce risks and increase profitability. Our mission becomes promoting the

---

[1] *Stork, Michiel, et al. A competitive and efficient lime industry - Technical Report by Ecofys. www.eula.eu. [Online] July 2014. http://www.eula.eu/file/475/download?token=5lpX8a3h*

development of processes and capabilities to provide the best customer lime production experience and value-generating solutions with the help of digitalization." [2] *— Carlo Cella, QualiCal CEO*

First of all, we've pursued this goal of being alternative, innovating our technical products and our technological perspective. We have also tried to give a competitive edge to the company innovating the ways, the form and the digital and communicative tools used in the relationship with the customer.

The above has been made possible thanks to my IT skills, now defined as a "digital mindset". This mindset allowed me to approach technology (within QualiCal also) as an instrument and not simply as the purpose. The shift from the Industrial Age to the Digital Age is complete and it's time for workplace thinking to catch up[3].

We will demonstrate how QualiCal became a case study, creating a new business model and new opportunities in the existing demand-asphyxiated market, a concrete example of how it is possible and fruitful to transfer the social communication 2.0, the way of communication and skills that many people have already gained, more or less consciously, at an individual level in their own private life experiences to the business world, to the industry and to their own workplace.

QUALICAL AND THE LIME PRODUCTION EXPERIENCE

Our Company was born from the contribution of two people only and has evolved into a small enterprise of less than 15 *people at work*. It is really a family business, yet operating in an international context. We are much smaller compared to our competitors that are medium-large enterprises, with 70 to 140 employers and part of multinational group such as ThyssenKrupp, ready to supply turnkey solutions and having already hundreds of references from all over the world.

Based on this assumption, we've tried to establish relationships with our customers on a personal level. We have never simply sold a product, even a complex product as it is a whole plant for the lime production. We've always tried to take care of our customers' needs, their technical and technological requirements. We have tried to orient ourselves to the customer experience, realizing and contributing to the experience of the use of the product, in our case, the lime production experience.

How were we able to be disruptive?

[2] Adrian Booth, Niko Mohr, and Peter Peters, Mckinsey, May 2016 [Online]: https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/the-digital-utility-new-opportunities-and-challenges

[3] Cate Gutowski, GE DIGITAL, 2017 [Online]: https://www.ge.com/digital/blog/8-lessons-leading-digital-age

How did we manage to use the technologies and in particular, digital communication to change and ride the possibility of overturning the existing business model into an innovative and competitive business model?

IIoT is changing QualiCal's skills and is enhancing QualiCal efforts to be a provider of the entire lime production experience!

We became the first Italian member of the Industrial Internet Consortium (IIC) and QualiCal technology is Industrie 4.0-ready.

For this reason, our business model is:
- No longer in direct competition with other pure kiln components suppliers,
- No longer a simple supplier of "steel",
- No longer a supplier of hardware.

QualiCal is now:
- a designer of *intelligent* lime plants,
- a developer of advanced analytics, predictive maintenance and social open source information, and a provider of PEOPLE@WORK with the Performance Reliability Center, data scientist and a pool of experts discussing lime contents among the Lime Global Brain.

Many opportunities present themselves when a company adopts a new green-field project in an existing brownfield facility. We were ready to supply our services and help our clients determine their own KPIs and make suggestions for improvement.

QUALICAL CASE STUDY

When I logged onto Facebook in 2008, I approached this new technological opportunity by trying to understand it and analyzing its business potential. What could I do by communicating with this social network? How could the new digital tools become the new functional and operational core of our business, our structure and our business models? How could I replace words like *LAN, Customers, Fax, e-mail, Phone calls, Meeting, Report* with *Cloud, Internet, Followers, Skype & Video-Call, Virtual, Notifications and Posts*? I did it by using the main feature of each social network.
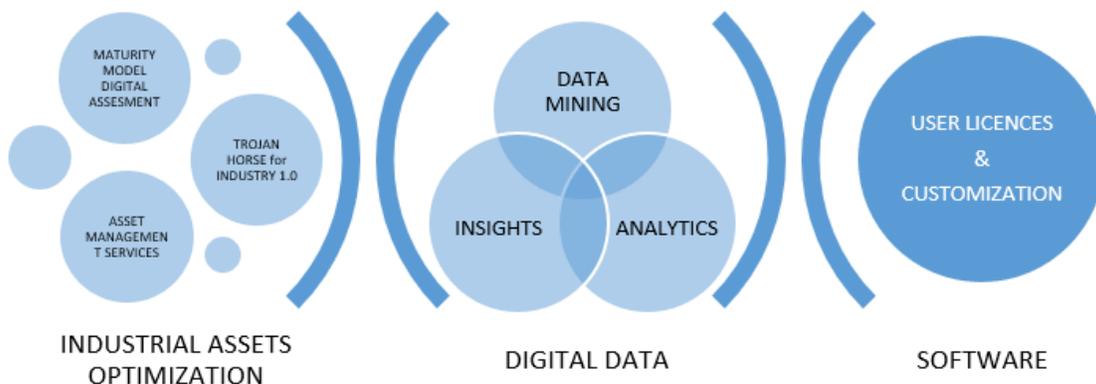

Figure 2 A New Business Model

Clearly, the advantage of doing so was to make the exchange of information flexible, fast, cost-effective and less time-consuming: The *content* would be the center of *discussions and relationships* between customers and suppliers.

MOSAICO: QUALICAL INDUSTRIAL INTERNET PLATFORM

The next generation of connectivity will link together appliances, cars and all kinds of objects. This transformation will open new opportunities, spawn new business models, and herald yet another major inflection point that leaders must manage.[4]

In the world of social media, there is a group of "followers" who work together, sharing a problem, a subject or content. In the same way my friends see my status on a social media platform, an enterprise community comprised of the users of one of QualiCal's plants could be informed about "how the plant feels today" with respect to its industrial assets and components.

For example, phrases such as "I'm excited, happy, surprised, disappointed" can be restructured to reflect the factory's operating status: "I'm operating, I'm in alarm, I need maintenance, I need assistance".

Figure 3 How do you Feel Today Facebook Status Example

Once the plant is equipped with the technology to collect data about its various states of operation, this data can be proactively shared as information with the people involved and interested in it.

Figure 4 How Plant Feels Today MOSAICO Status Example

I set myself to work to create what would soon be renamed as the industrial internet platform by industry giants such as *AT&T, Cisco, General Electric, IBM, and Intel* (Founding members of the IIC in 2014)[5]. The industrial internet is an interconnecting system between **machines** (assets equipped with all the necessary sensors), big **data**

---

[4] 6 Social Media Skills Every Leader Needs" Roland Deiser, Sylvain Newton, Mckinsey, February 2013 [Online]: https://www.mckinsey.com/industries/high-tech/our-insights/six-social-media-skills-every-leader-needs

[5] "Industry Sees Its Digital Future But Needs Help Seeing The Path There", Maggie Sieger, GE REPORT, Oct 29, 2017 [Online]: https://www.ge.com/reports/industry-sees-digital-future-needs-help-seeing-path/

(insights and analytics) and **humans** (people at work).[6]
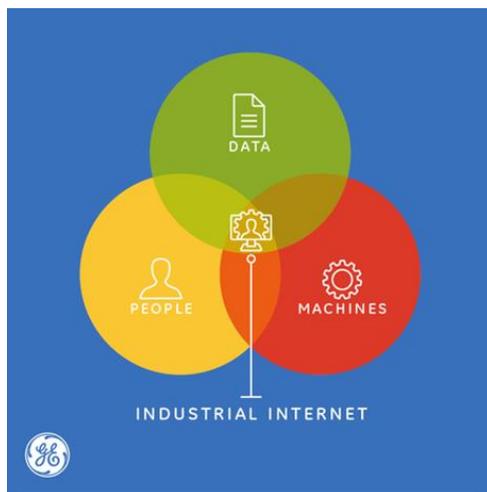
Figure 5 Industrial Internet Model from GE

QUALICAL BECOMES DIGITAL: MOSAICO IN ACTION

The Digital Lime Plant

To turn our IIoT plan into action, we first analyzed our assets, conducting an assessment to identify their degree of digitization: The Maturity Model Assessment. The Maturity Model Assessment evaluates the current state of the plant and the production process, identifies the potential points of intervention and chooses the right set of operating solutions with particular reference to industrial internet themes.

The Maturity Model Assessment evaluates the current state and the future vision to outline a detailed roadmap to implement the solution.

It reveals areas that have not reached their full potential and highlights where an organization aspires to be within the journey. Business priorities are aligned with the model results, thus targeting the business solutions that support the industrial internet vision.

The Maturity Model Assessment:

- Identifies the set of solutions and highlight the new hardware/software requirement to connect machines, data, insights and people

- Identifies the applicable services:

  o Defines the list of customizations (analysis, report, function, etc.) specifically requested by the customer

Figure 6 Maturity Model Question

---

[6] World Economic Forum - Industrial Internet of Things: Unleashing the Potential of Connected Products and Services – Davos, January 2015, http://www3.weforum.org/docs/WEFUSA_IndustrialInternet_Report2015.pdf

- Provide the technical specifications for the modifications and/or components to be improved

- Provide the commercial estimate for:

  o the detailed engineering modifications

  o the supply of components (mechanical, electrical, etc.)

All sensors and instruments representative of the nervous system of the plant itself are defined: those capable of collecting the "status" or, the "how do you feel today" of each component. The challenge is to ensure that only relevant information reached, in push mode, the interested persons (followers), at the right place, at the right time.

This assessment helps reduce risk, generate a return on investment and reap the benefits of deploying analytics in a data science context.

QualiCal customers generally offer one of the following use cases:

1. data collection (where's the value)
2. a traditional engineering design analysis customer that has an engineering problem and does not have an engineering solution
3. an interest in business model transformation

Customers want to start looking at their own opportunities in the market from more than just a digital perspective.[7]

Figure 7 MOSACIO Maturity Model Infographic

- **Connect**

The data is collected from the field and stored in a cloud database. Data are centralized to enable advanced computing and analysis.

---

[7] "How Can Digital Suppliers Accelerate Customers' Transformations?", Astrid Rauchfuss , Tobias Schmitter , Philipp Bode , and Dominik Michaelis, BCG, March 9 2017 [Online]: https://www.bcg.com/publications/2017/telecommunications-technology-industries-how-can-digital-suppliers-accelerate-customers-transformations.aspx
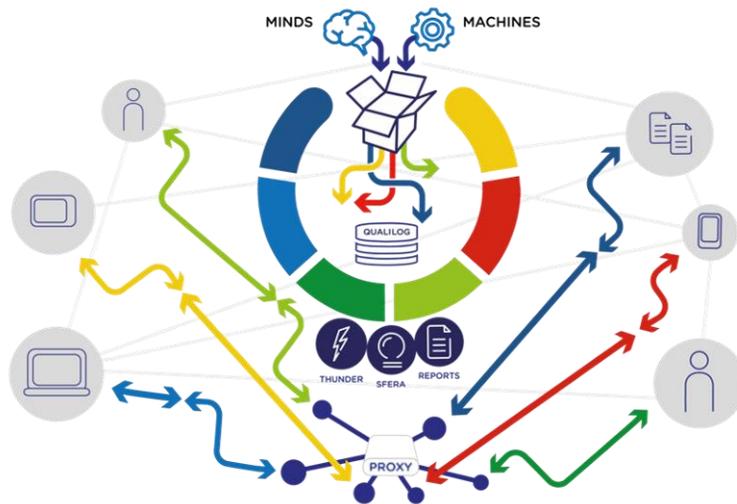

Figure 8 MOSAICO Digital TWIN

- **Cloud**

Above all, it was important to make the data available within the communication platform that was being created. This could be a virtual place available to everybody: the cloud**.** The choice to move to the cloud was absolutely innovative compared to the existing business models that foresaw the presence of data on physical servers inside the company data center.

To educate followers about this change, I tried to use the new digital operational tools they apply in their personal lives already. In this case, we positioned data into a dedicated Dropbox account. This choice has allowed us not to force ourselves to build a proprietary cloud platform with all the complications in terms of costs of development and

maintenance time. It is a low cost, out-of-the-box solution.

- **Monitor**

The second step was to create a viewing platform that was revolutionary in comparison to the normal control room where the operators sit physically looking at a series of monitors.

- **Mobile**

We have developed a proprietary application (MOSAICOAPP) that allows operators (from now on named *followers*) to be able to monitor the system via mobile, no longer requiring physical presence in the control room.

Employing a mobile device in a control room of an industrial plant and using software in the App version instead of the traditional industrial automation software reserved for specialized technicians represents a difficult, evolutionary leap. This choice has allowed a
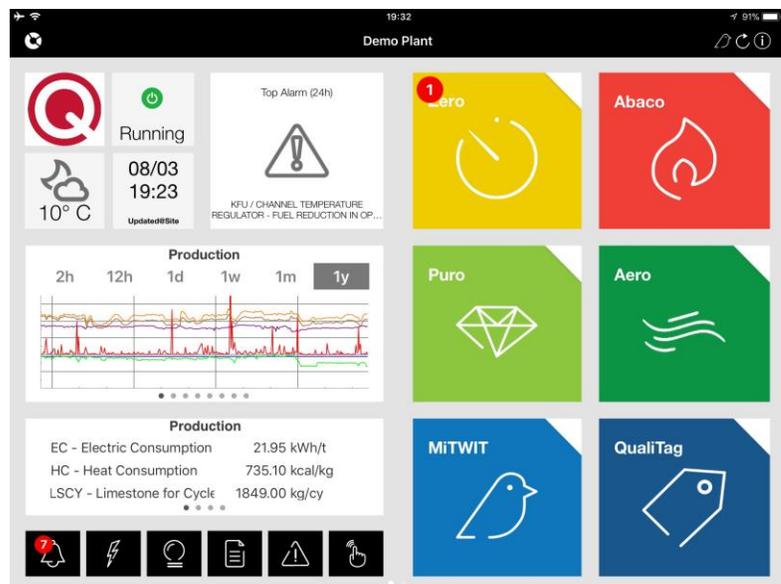
Figure 9 MOSAICO App Monitoring Page

greater audience to be able to share, even in monitor mode (read-only), the operating status of the system**.** Creating the software in the App version has also led to other benefits, such as the possibility that the software itself can be updated through a download from the iTunes® Store or Google®[8].

Before the arrival of the App store, software had to be physically installed on every PC and distributed worldwide in each control room of our plants to update them.

- **Analyze and Predict**

What represents the real evolutionary leap in the introduction of each new technology is not limited to doing what has always been done with new tools, but using the new tools to do new things in a new way. After having collected the data and making it available in the cloud, we used the analysis (even predictive) of the data to make sure that the results could reach users in push mode, putting the right information in the right hands at the right time.

That is the difference compared to the mobile monitor which was an important past innovation. The mobile monitor was based on the cornerstone of the visualization of pull that obliges the user to search in the

database for what he wants to view. The real challenge, in a push model, has been to ensure that only relevant information reaches the interested follower in the right place, at the right time.

Figure 10 MOSAICO App Landing Page - KPIs

- **Notifications**

The push transmission on mobile devices is performed through notifications. Similar to the notice you may receive from a weather app warning you of an impending storm, our app transfers specific information or a class of data to only the interested users.

---

[8] Apple and GE partner to bring Predix industrial apps to iPhone and iPad-Ryan James, Apple, Amy Sarosiek, GE DIGITAL, 18th October 2017, [Online] https://www.apple.com/newsroom/2017/10/apple-and-ge-partner-to-bring-predix-industrial-apps-to-iphone-and-ipad/
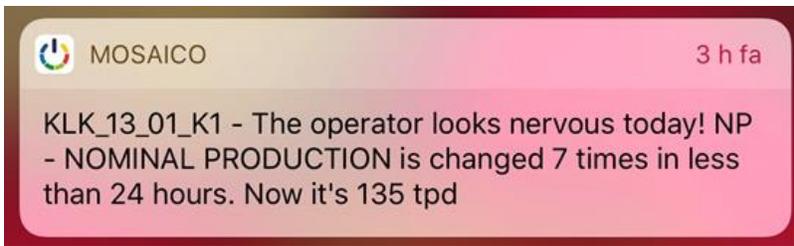
Figure 51 MOSAICO Notifications: Right Information. Right Hands. Right Time.

The electrical maintenance technician receives only notifications relevant to the electrical equipment. The mechanical technician is informed about spare parts to avoid unplanned downtime. The plant manager receives information about the actions to be carried out by the operators in the field.

People@Work
- **Followers**

Another pillar of the industrial internet is the so-called People@Work[9]. The operators of the industrial plants have always been there. They are the people at work. What is disruptive in the new business model is the need for connection, or the interconnection of the followers with the system or with big data.

We have put the content in the center of the discussion. This allows interested parties - connected in "ON mode" thanks to their mobile devices - to become followers. Followers, in the social environment, however, do not access the information in read-only mode. They must contribute to the generation and sharing of the content.

Data & Analytics
- **Data and Big Data**

Because of the interconnection of a digital industrial asset, analytics and People@Work, we need to speak in terms of big data, rather than databases and data.

"Problem solving and troubleshooting, as well as optimization of asset and systems performance, will be supported by powerful software able to leverage big data to identify correlations, causal relationships, and sensitivities that have so far gone undetected. This where the hard work is done, exploiting greater amounts of information to identify better strategies for assets and system utilizations. But to be really useful, this complex information needs to be conveyed to the right people at the right time, and in a way which is sufficiently intuitive, easy to grasp, and therefore quickly actionable" [10] ~Marco Annunziata & Peter Evans

---

[9] "The Future of Work", Marco Annunziata, October 2015, [Online]: https://medium.com/@marcoannunziata/the-future-of-work-5553f540424a

[10]"The Industrial Internet@Work" Marco Annunziata,Peter C. Evans, GE, 2013 [Online] https://www.ge.com/sites/default/files/GE_IndustrialInternetatWork_WhitePaper_20131028.pdf

Figure 62 MOSAICO ZERO Analytical App WORKFLOW

Within this framework, the set of presented information offers the opportunity that the resulting value of combining this information is worth more than the sum of its individual data elements. The disruptive element, in this case, is precisely this added value that does not limit the discussion around the data but makes the context of the discussion dynamic and fluid, thanks to the continuous contribution of the objects.

Privacy

A fundamental theme when it comes to digital data is privacy. I wonder why almost nobody has ever asked the question of what level of privacy was reserved for our data before they were digital and cloud-based. The illusion that data on paper was protected and the lack of education and technical information regarding the collection, transfer and storage of digital data is driving a lack of knowledge about privacy as a concern in the current context.

Similarly, relatively few people limit their private consumer experience by refusing to create online accounts. Many executive leaders use outdated privacy policies that forfeit the opportunities arising from data storage and sharing on the corporate cloud.

Undoubtedly privacy deserves reflection, and my answer is not aimed at how to protect data, but at what level of privacy we are willing to surrender due to the benefit of gaining insight from analysis of big data. Think how much is done at the individual level using Google® traffic maps and Waze®. The moment I provide a piece of my privacy – my location – I will have available to me the analysis of the aggregate position (and anonymous to all the people who decided to share it) and whether the road that I'm on or headed toward contains more or less traffic! They can safely answer "no" when my phone asks me if I want to share

my position, but then I cannot complain if I get in a 10km queue on the highway.

Today, greater efficiency can be obtained. A common example is that, usually a company does not know when unplanned downtime will happen in the plant that should operate 24/7. Now, accessing the plant data not enables the detection, but also prioritize the predicted downtime event by importance to identify and solve the most crucial problem occurring in the plant.

OVERCOMING INNOVATION BARRIERS IN THE INDUSTRY

Once you have had a workforce of "digital natives," who have come of age immersed in digital technology, they are not going to accept a tool kit from their employer that's less robust than what they experience in their personal lives.

On the one hand, human beings have been able to overcome many evolutionary challenges, so far, because they have been able to adapt. On the other hand, when it comes to proposing new ideas and strategies about business which may involve an evolutionary type of effort, we are often reticent to think about evolving in those terms. We are more inclined to stay in our "comfort zone."

In old industries such as the Lime Industry, innovation can face many obstacles. Whether you are trying to lead an industry, create a new market or just do things differently, innovation is difficult. The following barriers are frequent and difficult to overcome:

- Short-term focus
- Lack of time, resources or staff
- Leadership expects payoff sooner than is realistic
- Management incentives are not structured to reward innovation
- Lack of a systematic innovation process
- Belief that innovation is inherently risky
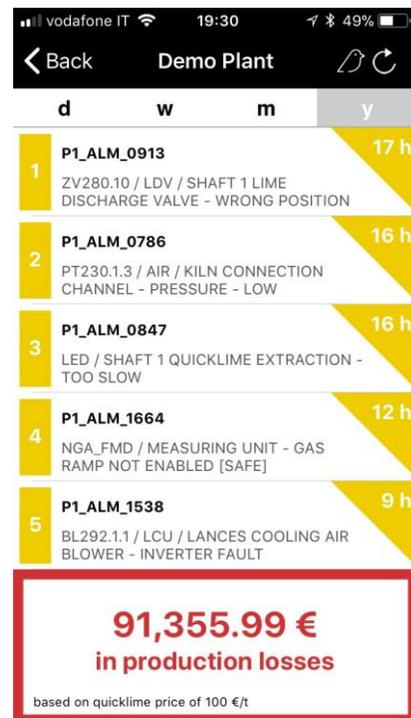
*Figure 73 MOSAICO ZERO Drill In Unplanned Downtime's List*
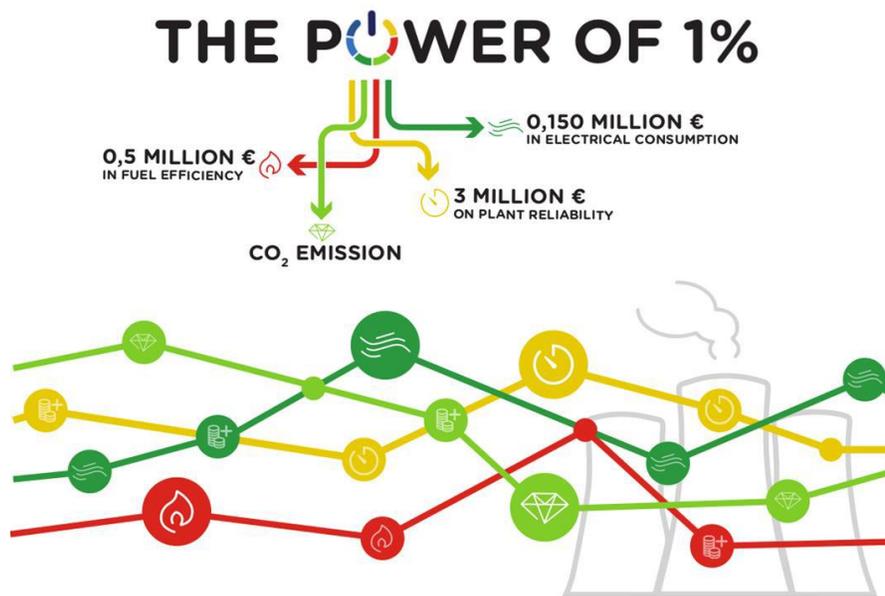
Figure 84 The Power of 1% MOSAICO Outcome

Within the Lime Industry, introducing a completely new solution capable of providing the desirable outcomes and supplying a set of after sale services that enables reaching this outcome has not been easy. Even with the promise of many advantages, it is hard to convince process-driven businesses to shift from the old (but still working) way of control, managing a plant on routine operation, to a completely new system – on-demand basis and prescriptive analytics. Even if it means simplifying and rewarding the workday of everybody in the plant and giving a sense of modernity to an old industry such as the Lime Industry, the notion of IIoT was intimidating to many lime producers.

If, individually, we embrace the use of digital and social networks, in the professional field, many leaders are even more worried about the difficulties and risks that can be hidden in the mesh of an "open" communication dynamic, compared to current business communication processes.[11]

When leaders reject or ignore the opportunity to implement a digital mindset and social networks in business processes, they effectively inhibit collaboration, sharing knowledge, and developing capabilities that can collectively create a competitive advantage. However, it is clear that the speed and agility of adapting to new opportunities is now, more than ever, the

---

[11] "Ops 4.0: Fueling the next 20 percent productivity rise with digital analytics", Mckinsey, 21st April 2017
https://www.mckinsey.it/idee/ops-40-fueling-the-next-20-percent-productivity-rise-with-digital-analytics

key to survival of many industrial businesses.[12]

Data analytics and digital communication tools, are tools available to all, whose applications and use have no technological limits which cannot be overcome. It will be up to each person to gather the potential and opportunities offered by these new tools and make them interpreters in companies, schools and institutions in which you will be capitalizing on these new horizons.[13]

➢ Return to IIC Journal of Innovation landing page for more articles and past editions.

The views expressed in the *IIC Journal of Innovation* are the contributing authors' views and do not necessarily represent the views of their respective employers nor those of the Industrial Internet Consortium.

---

[12] "Winning with the Industrial Internet of Things" Accenture, 2015 [Online]
https://www.accenture.com/t20160909T042713__w__/us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_11/Accenture-Industrial-Internet-of-Things-Positioning-Paper-Report-2015.pdf

[13] "Driving Unconventional Growth through the Industrial Internet of Things", Accenture, 2014 [Online]
https://www.accenture.com/t20150523T023633Z__w__/us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_11/Accenture-Driving-Unconventional-Growth-through-IIoT.pdfla=en