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Oil and Gas Safety Initiative

Guillermo Beltrán Seghers

Key Words:

Safety management, common goals, efficacy enhancement, avoiding risk.

Abstract :

For the last decades a great leap forward has been given on the oil and gas companies safety enhancement. However, most of the projects focused on the individual improvement and the importance of a collaboration between companies to face common safety challenges have been put aside.

Losing the fear to collaborate with the competitors for a common benefit, as is the safety improvement of the workforce and all the people related to the oil and gas extraction, transport, processing and consumption, who are basically the entire society, is absolutely needed. The need to learn from previous accidents is mentioned in several essays from different authors. The companies are the most interested in learning from their own and external mistakes, both to their own economic profit and the society benefit.

There is a solid foundation from which starting the path. The work already made by the biggest multinational oil and gas companies to fight the climate change through the OGCI is an unprecedented initiative. This verve must be leveraged to give a step forward and face the safety management challenge with a similar approach and based on the IOGP and CCPS current progress in safety.

This essay proposes a series of projects which aim to progress on common safety development. The pillars proposed for this enhancement are 3: technology, management systems, and safety culture. Nevertheless, the items to work with must be chosen by the companies, so that the safety will never be compromised due to an unnecessary competence and will be based on collaboration and mutual learning.

Introduction

As societies evolve, the stringency levels in all areas raise. This concept is applied the same way to the industry, which is always expected to increase productivity and quality, has less impact on the environment and, specially, be safer for employees and people who could be affected by accidents. From this demand comes the need of working towards avoiding all the accidents and achieve the stability in terms of the derogation of danger in the working environment.

Society has become specially critical with the Oil & Gas industry during the past few years. Incidents that were accepted decades ago are no longer allowed. Fracking, diesel restrictions from the governments, renewable energies emergence and some environmental disasters caused by Oil & Gas companies have put this industry in the spotlight. The own industry should be conscious about this situation and be as critical or even more than the society so it can survive.

Each Oil & Gas company should focus their work on safety as a priority and be creative when facing the challenges so they can anticipate the potential accidents. To this aim, this project proposes the molecular company model with the purpose of describing the different profiles of how to define a company. In this model, the way that a molecule acquires its properties is compared to how it is done by a company.

First of all, a molecule is defined by the type of atoms that make it up, therefore, the properties of a molecule which is made by two atoms of hydrogen and one atom of oxygen are different from those of a molecule formed by two atoms of sodium and one atom of sulphur. Same way an organization is made by the people that conform it, this is why it is necessary to work so all the employees are aware of it and prioritize safety, because they are the company.

From a molecular point of view, there are differences in the properties depending on the structure. The chemical formula C_2H_6O may correspond to ethanol and its isomer the dimethylether, and although having the same atoms and in the same proportion, their properties are completely different. In the same way the safety of a company will be affected by their own structure and the importance granted by the higher sectors.

Finally, a molecule's characteristics can be affected by interactions with the environment. Thus, water is liquid at environmental temperature due to the hydrogen bonds formed between molecules. Similarly the way a company interacts with the envi-

ronment and specially with other companies can affect the way that safety is managed.

In the first instance, the one about people, companies are working hard on increasing capacity and training of workers and rising safety awareness through safety culture campaigns. In the second instance, the companies are betting on giving more importance to the HSE area, both to the own department itself and inside other departments. It is in the third instance in which the push from the companies is not being as strong as one would expect and, however, it is crucial to achieve the safety targets mentioned before.

For all these reasons this essay is going to be based on the development of safety from a point of view of interaction and collaboration between companies and it aims to answer two crucial questions: Why working on this third aspect in the Oil & Gas sector has become so important? And, how should be focused this joint initiative and which aspects should be work on?

Necessity

It must be remembered that the main reason of enlisted in safety projects reside in the need of minimizing the risks to avoid people injuries, environment pollution, property damage and/or damaging the company reputation. However, there are several underlying reasons for the need of working on a specific project of collaboration between companies to enhance safety.

Oil and Gas Market

The first reason to work on this specific project can be found on the own Oil & Gas market and the crude oil price evolution in the last decade.

After the Chemical Safety Board (CSB) investigations of the BP accidents in the United States of America, firstly on *Texas City* refinery in 2005 and afterwards, in 2010 on *Deepwater Horizon* drilling rig, it was pointed out as one of the main reasons of the accidents the drastic safety cost cutting measures accomplished on the previous years by the company (CSB, 2016). Maintenance deficiencies, lack of investments in new equipment or fund cuts on safety are some of the reasons that led to these accidents.

On his essay "Dealing with Catastrophic Safety and Environmental Risks: Lessons from the Global Financial Crisis" Andrew Hopkins points out that many major accidents can be traced back to cost cutting measures that took place in order to maximise profits (Hopkins, 2010). This cost cutting measures result in risk assumptions

which can be latent for several years and ultimately the alignment of different factors leads to a disaster.

Between the years 2011 to 2014 the crude oil price remained around \$100 per barrel whereas, after the second half of 2015 this price fell under minimum peaks of \$30. This circumstance has had a negative impact on all sector organisations and due to this reason several cuts in investment can be found, including safety cuts. According to Hopkins theory these factors imply the latent risk existence which can result in huge accidents in the coming years and, therefore, a review on how the companies face these risks is essential.

Collaboration with competitors

Collaborating with competing companies on the same market can seem counter-productive from a classical point of view. However, it has been demonstrated that in certain context not only is not counter-productive but it is also beneficial for all parties (Hamel, Do, & Prahalad, 1989). The collaboration, between two or more entities, can be useful to face common challenge on specific areas, by putting the classical win-lose point of view aside, and the focus on the win –win approach.

From an Oil & Gas company point of view, it is increasingly complex the distinction between different energy industries, due to the most recent technological developments and the increasing competition for different markets. Few years ago, there was a clear difference between companies destined to generate electric energy and those destined to the transport sector. However, nowadays companies traditionally classified as electric companies are penetrating on the transport sector through electric cars, and companies traditionally classified as oil and gas companies are starting to invest renewable power and in the electric sector. On the other hand, the natural gas prominent role on the approaching energetic transition opens the markets to different kind of companies and thus, breaking the traditional market.

From a society point of view, companies such as Exxon Mobile, Shell, BP or Total are still labelled as belonging to the Oil & Gas sector, with all its implications. There are even cases in which companies are changing their names to reflect this new global reality in the energy sector by gradually differentiating themselves from Oil & Gas, such as Statoil which has changed its name to Equinor. This is why collaboration between companies to reach common challenges is essential to survive. If the companies are not capable of changing as quick as the world, they are condemned.

Fortunately, this collaboration do not start from scratch and some initiatives already exist which have laid the foundation for futures challenges. Some independent associations such as the Centre for a Chemical Process Safety (CCPS) or the International Association of Oil and Gas Producers (IOGP) are already promoting a *responsible collaboration* between companies to optimize the safety efforts.

In addition, in the year 2014, the CEOs of some of the biggest oil and gas sector companies led the creation of a collaborative organization designed to fight the climate change and the greenhouse emissions in a more effective manner. This idea gave rise to the Oil & Gas Climate Initiative (OGCI), to which, more companies join each year, and already represents around a 30% of oil and gas world production.

The decision of these thirteen multinational companies of working together in the fight against climate change is the best example of the win-win strategy. This initiative is as well an example of how to reach a non-compete agreement for some fundamental items which can affect in the same way all the companies and society in general.

All these aspects can be applied in the same way to the safety, in which the non-compete commitment and the straight collaboration and transparency from all the companies is the key to reach the objective of lowering accident rates in the sector. Therefore, the OGCI must be the example to follow for the creation of an Oil and Gas Safety Initiative.

Learning previous accidents

The history of the oil and gas production, from its beginning on the 19th century and mainly after the mid-20th century boom, is related to huge disasters. Most of the worst accidents have occurred on oil rigs such as *Piper Alpha* or the *Alexander L. Kielland*, however, there have been serious accidents related to other oil and gas industry aspects such as the Exxon Valdez or those occurred in *Los Alfaques* and in *Lac-Mégantic*.

Several of the biggest accidents in History share roots causes. If after this accidents the Oil & Gas companies had learnt the lesson, thousands of lives, environmental irreversible damage and billions of dollars would have been saved.

The 2010 *Deepwater Horizon* accident, one of the worst Oil & Gas accidents, occurred in the world leading economic country and to one of the three biggest Oil and Gas companies. This accident could have been avoided had the company been learnt from previous ac-

cidents such as the similar *Texas City* accident, already mentioned, or the *Piper Alpha* accident. Among others common causes, both, *Piper Alpha* and *Deepwater Horizon* share a clear lack of communication or an employees' perception of lack of authority when it came to close the petroleum pump despite they were already seeing the explosions.

The *Deepwater Horizon* disaster had a big impact on the Oil & Gas industry and its study and the lessons learned from it had a great diffusion. However, it should be considered the impact this accident would have had if it had happened in a different place and to a different company. This learning has been possible because of the exhaustive investigation carried out by the CSB in the subsequent years after the accident. The problem is that not all the Oil & Gas disaster investigations have the same detail level and/or the same transparency. Depending on the company and country government safety culture level, the investigation of an accident has more or less level of detail, quality and transparency.

Concerned about the *Deepwater Horizon* accident, the European commission published in 2012 a report (Christou & Konstantinidou, 2012) which says: *"there seems to be a unanimous agreement of all stakeholders that information exchange on past incidents and accidents is of paramount importance for preventing the recurrence of similar accidents in the future. In that context, Articles 22 and 23 of the proposed legislation require sharing of information and transparency in the safety performance of operators"*. In the same report appears a brief review through the most catastrophic offshore accidents in the Oil & Gas History, the common causes and consequences and the existent databases with this kind of accidents information. Despite there exists some databases and information sources, the information is usually dispersed by country and not complete in any case.

Faced with this scenario there is a clear need of a common learning from past events, with deep, detailed, first hand and with a common format information, without the need of government regulation, through a self-regulated organization promoted by the companies. The level of maturity that this transparency exercise requires is really high, however, after the road already travelled by the CCPS and the IOGP, with the creation of the OGCI and with the imposed need previously mentioned, it looks like the perfect time to start a project of this magnitude.

It should be useful to learn from the analysis of more advanced sectors in safety initiatives, such as the aviation industry, with the

Skybrary initiative, or the nuclear sector, with the *Global Nuclear Safety and Security Network* initiative.

Accident effects

If an economic analysis of the accident that has changed the safety perception in the Oil & Gas industry, the *Deepwater Horizon* accident, were carried out, it could be seen that the balance for BP is disastrous. One of the main causes was directly related with the pressure present due to cost overruns for the rig *Deepwater Horizon* rent, around \$1 million per day. The day the accident occurred there was already a delay of 43 days. The accident entailed losses for BP in several ways: zone cleaning, fines, image damage, Macondo oil well loss, affected people compensations, including loss in fishing and zone tourism and a long etcetera that has been calculated in around \$62.000 million, which means almost 1,500 times the \$43 million in cost overruns.

The accident meant for BP, one of the biggest company of the world, almost the bankrupt but, ¿What did the accident mean for all the other companies in the Oil & Gas sector?

Goossens (Goossens, 2012) in its essay about the market after the Mexican Gulf disaster analyses the competitors economic consequences and shows the market evolution in the immediate days after the accident (Figure 1)

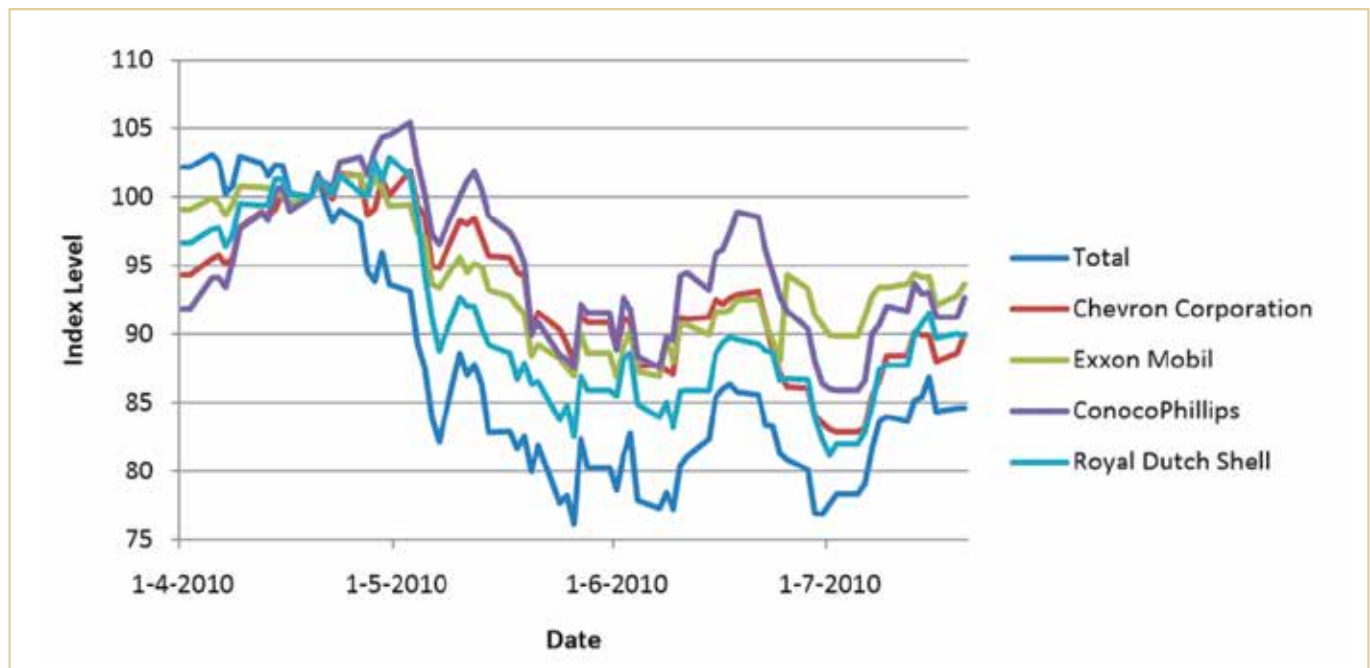
The chart shows how a few days after the accident and while the spill was still happening, the BP competitor companies value suffered a drop on their market capitalizations, but not comparable with the BP's. In this case it must be kept in mind that market fluctuations depend on several factors, such as the crisis in Europe that time and therefore, the accident is not the only factor to be considered. However, the damage in the Oil & Gas sector image and reputation were high and the scepticism and fear about suffering a similar accident were set in the other companies in the years following the accident.

Thus, it is clear that no company can afford to suffer an accident similar to the *Deepwater Horizon*, but also it is bad that competitors companies in the same sector suffer an accident with these characteristics.

Proposed model

The need to increase the openness and improve the communication channels between companies, and to achieve an effective learning from past accidents, would be a sufficient reason to consider a joint initiative that deals with common safety challenges. How-

Figure 1. Changes in the market capitalizations of the five main BP's competitors after the Deepwater Horizon accident (Goossens, 2012)



ever, this initiative can go beyond and be developed to maximize the advantages of a collaboration project of this features.

As it has been discussed in the last section, the OGCI should be the starting point from where to develop this project. This is why the structure of the presented model is going to be based on a similar organism but will focus on safety. The name "Oil & Gas Safety Initiative" (OGSI) is proposed. The structure of the organization should not result static. It should not be forgotten that, in the moment of being carried out effectively, the features of the initiative should be negotiated and accepted by every stakeholder in terms of everyone interests. It also should be the companies willingness to improve safety which sets the limits of the project.

General ideas

The first step when undertaking the project should result from defining the key elements of the organization itself and the role that companies exercise in their implementation.

In the case of OGCI the own companies themselves should provide the organization with the employees to work in the different projects that are being carried out. The organization also invests in startups that are developing technology to achieve the project's targets. The financing is done through a fixed quote paid by each participant.

In the case of OGSI it can be raised in a similar way or alternatives that fit in better with safety specificities can be introduced. It may be interesting in this project to create a direct link between companies rotated through the OGSI. That is, in the case of the climate initiative, it is the organization itself who develops the project in an independent manner and then the results are taken to the companies. In the case of the safety initiative the companies themselves should provide the organization with information so the organization summarizes and distributes it in the adequate way.

In the safety specificities, it should also be taken into account the limitations in confidentiality that are intrinsic in its management and so the red lines should be clearly defined from the beginning of the project. It is fundamental including in the OGSI budget the direct hiring of experts in analysis and independent consultants. For the financing, its approach should be similar in both initiatives so in the future, with the development and the achievements, a partial or total self-funding status can be attained.

Structure

The presented model divides the organization in three big blocks: technological development, management systems and

safety culture. The three proposed blocks have been the three classic tools used to fight against the risks historically (Hudson, 2007).

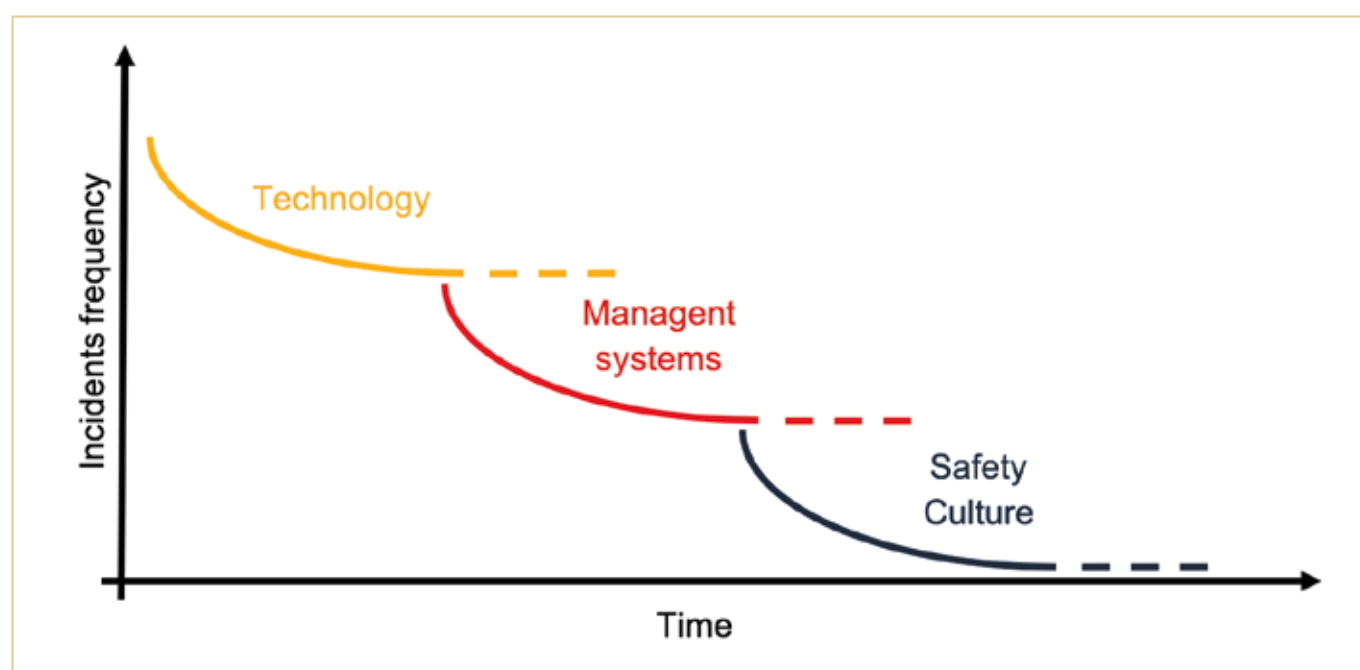
In the first stages of the Oil&Gas industrialization, the associated risks were very high and the culture surrounding the employees was based on that the small accidents “are part of the game” and the injuries, broken bones and even finger losses were considered “Medals of Honor”, since the work needs to be done as quick as possible this “small” accidents are minor issues and the employees need to adjust their image to that of the “wild and rough male” (Haukelid, 2006).

After years of really high accident rates and serious accidents in the industry, the first solution brought to the table was the development of safer technologies. Old heavy tools were changed for more sophisticated, lighter and less dangerous equipment. The decrease in accident rates was shown quickly, but at a certain moment, the implementation of safer technologies turned insufficient to keep decreasing accident rates. It is at this point when companies as BP, DuPont or Tripod created operational safety management systems to ensure the adopted measures in relation to safety were registered and also given structure and direction.

Once again it is observed how the investment in technology combined with work on management systems reaches a point where the results are not improved in accordance with such investment. This point is reached when what is described in the management systems, procedures, handbooks, etc. is not consistent with the everyday reality in the facilities. In some cases employees feel a false sense of invulnerability; in some facilities, production is given priority over safety; some safety systems are omitted because of convenience or because it is preferred not to say anything rather than admitting that procedures are not known and many other cases where theory differs from reality. This is why safety culture projects that eliminate the real gaps between “what is said” and “what is really done” are being done.

This is how, fields in which efforts to eliminate the risks in the Oil&Gas industry have been evolving, proposing alternative solutions to keep improving in safety once it was reached a point in which accident frequency was not reduced by a higher investment (Figure 2). This is why these three fields should be developed in a joint manner and in the same way, solutions should be proposed for all of them when the search of a higher safety is focused, combining the interests of the companies involved in the Oil&Gas industry.

Figure 2. Safety management learning curve (Hudson, 2007).



Below are shown some proposals of safety improvement projects in each topic mentioned above. These proposals are only some examples of the possibilities of the project, but should be the companies themselves who decide which kind of project should be carried out and, therefore, it does not make sense to present any of them in great detail in this essay.

Technological development

The case of the technological development is the only one of the three structural pillars which can be directly extrapolated from the OGCI. The model of the organization created to fight the climate change is based, at the present time, exclusively in technology to fight specific problems.

Therefore, the approach that should be given to this section should be similar to that described in the previous one about the OGCI. Experts from all companies, should decide which are the more interesting R+D projects related to technologies, that would improve safety in the facilities and spend part of the budget to develop them, through investments in start-ups related to this technology and by the direct work of company experts in this field.

A particular case of technological development that should be reviewed at the same time it is reviewed the way in which safety is managed, is the tool for reporting incidents. To develop and use a common tool for incident report and record learning in all companies may turn to be a differential element when it comes to preventing accidents. Being able to count on a common structure when the accidents are analysed, involves understanding the causes, events, consequences and lessons that can be learnt from accidents easily. In the same way, it would facilitate the duty when it comes to analyse the incidents, deviations from the normal operation, preventive barriers failure, etc. in a comprehensive manner using big data. In this way, trends could be detected, deviations could be predicted and accidents could be prevented before they happened.

A common tool of report as the described in the previous paragraph, could greatly improve the quality and quantity of the information compared to the ones now handled by the companies. However, in the event of being developed, it should be considered to confine to the tool itself certain confidential information to prevent leaks to other companies.

Another added advantage of developing this tool for report management or any other technology that implies an innovation in the market, is that it can be commercialized and used to finance part of the project.

Management systems

A common learning of the management systems between companies involved in the project, implies taking steps so far unknown. Even in projects as the one of OGCI. Reaching this point involves making a very important exercise in transparency and willingness to collaborate for every company. However, this could report benefits when it comes to preventing accidents. The last update of the ISO 29010 rule is already working in this way of the management systems standardization.

To be able to carry out the reporting tool described in the last section, it is necessary to do first a standardization of the safety processes in the companies. Every company has a different way to regulate safety, to subdivide the different classifications of the already happened incidents, to carry out the investigations or to spread the lessons learned. Reaching common points to discuss every topic related to safety can be difficult, but in the long term it involves increasing the communication and improving safety when reaching a common language and terminology.

Regular common safety meetings could be introduced. In this meetings, topics concerning every company could be discussed, from the results and lessons learned everyone can obtain a positive return. Good practice would be the systematization of selection and sending of learned lessons to all concerned.

On the other hand, rules and common procedures can be gradually discussed and introduced, born out of the pre-existing companies and improved with the experiences of each one of them.

Another new element that could be introduced with the creation of the common safety initiative would be the modification of the severe incidents analysis. It would be interesting the participation in the research team of the accident of people directly related to OGSI. As it has been mentioned in the previous section can be convenient having incident analysis experts without any direct link to the company to carry out an independent analysis of the events.

Safety Culture

Safety culture projects are relatively novel inside Oil & Gas industry and therefore, it is the perfect opportunity to create a combined project. Accordingly, a White Book of Oil & Gas safety culture could be prepared, explaining what safety culture is, how this is approached in Oil & Gas sector and which topics are going to be worked in the future.

Furthermore, safety culture common campaigns could be created to show that the work in safety is a real priority, thus enhancing the workforce culture. This safety campaigns also would let to bring closer the work developed in the OGSi to the workers and show the need to become aware about safety from all parts.

Relevant people in safety performance from each company could gather, attend conferences and share ideas in collaborative safety meetings organised by OGSi. Besides this safety meetings, some awards could be organised which would get involved and motivate Oil & Gas workers to keep improving safety on their workplace. Positive recognition reinforce that the modified behaviours are kept in the long term, while the negative loses effectiveness in behaviour modification quickly.

The most important thing of all these actions, and mainly those which are related with results comparison between companies, is not to create a competition feeling that could derivate in a loss of safety effectiveness instead of in an improvement. A very clear instance of this can be seen in the last suggestion about the safety awards. If the awards are based in a low incident rate, it can add pressure in teams to have a very low incident rates to reach the objective and this can result in that some workers decide do not report some incidents. This would falsify the data managed by companies. However if, for instance, the awards are based on the best good practices, the spotlight is put in the motivation of doing the generation of the good practices in an excellent way.

Conclusions

The main conclusions of this essay can be taken directly from all the previous discussions from the main body.

The first and most important conclusion that must be patent is that for the different reasons mentioned in the second point it is crucial to develop a job towards a larger transparency and communication between companies. This initiative has the potential of saving lives through the learning and prevention, but it is also economically positive for the companies.

Once the first conclusion has been understood and accepted, the second conclusion must be exposed: the most suitable way to carry out this initiative must be marked by the participant companies own reality and maturity. Some of the exposed proposals have a very high potential, but if the maturity to carry them out is not sufficient it would be more correct to postpone them and focus on those actions that are going to be truly effective and are going to mean a real change in the safety development on the common framework. ■

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