The impact of the open-source solutions and the Internet of Industry in the energy sector

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Abstract: **Over the past years, open-source software has transitioned from an enterprise hopeful option in a niche market segment, to an impressive mainstream approach across the infrastructure software and application development. An open-source agile integration approach covers solutions like systems management, operating systems, automation, virtualization software, development tools, and DevOps-enabling lifecycle, deployment, configuration and operational management tools, middleware, database software, cloud technology and many more. The integration plays a key role of distributed processes by providing a new approach of solutions. Combining technological capabilities with different organizational and process approaches makes the real transformation.**

I. Introduction

The global economy in the context of COVID-19 CRISIS is rapidly transforming to a stage unknown till recently. There are not so many market segments where there is not at least one open-source solution available, and in most cases, there are multiple open-source technologies offering alternatives to traditional vendor-locked solutions.

On strategic level, the software solutions are forecasted to provide a completely different understanding on big data, application programming interface (API), Internet of Industry (IoI) and many more. Beside this, the software needs to cover completely different stakeholders, operative functions, business models, engagement channels, and macro systems.

The use of IoI can be significantly implemented regarding the digital technical infrastructure for the energy sector – energy transmission and distribution. The support of the opens-source based IT-infrastructure could influence the process in a pragmatic way boosting the data stream over the internet relevant protocols for communication. It is expected that in the next years over 25 billion smart devices will be connected – power consumers with significant importance for the energy sector.

Therefore, it will be a significant challenge to find a sustainable way to manage the operative communication and capacity. The IoI is more focused on the software side and the open-source environment is providing a good functionality regarding this process influencing the optimal operation of the grid elements – the so-called technical infrastructure.

II. Model and Methodology

What the companies in the energy sector expect from their software and hardware solutions is the flexibility to adapt to new market dynamics, realign to capitalize on opportunities, and do all of this without missing a beat in efficiency and uptime. The response time also plays a significant role regarding all of these processes.

The organization of the power generation, transmission and distribution can restructure overnight and make new product options accessible to the internal and external needs. This will cause rapidly an enormous advantage towards the competitors. Also, the supervision approach will become more comprehensive and sustainable providing additional advantages to the extension of the power infrastructure.

The flexibility to restructure existing applications and data is the key for understanding the different business objectives and providing a new generation of services. The demands that appear on a daily basis are placed on old legacy, which in most of the cases is difficult to be scalable to the digital innovation in the twenty first century. Internal business workflows continue to rely on core systems of record and their existing IT base.

On the other side the new challenges in the energy and transport sectors like the need to extend systems in order to reach partners, the increased adoption of cloud applications, hybrid cloud IT environments requests modern application solutions.

This makes the integration approach more important and providing solutions in a faster, continuous way even more critical.

III. Result

The answer to these challenges is the agile integration – an architectural approach that matches methods and practices with technologies for the needs of rapidly integrating applications and data. During this process

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platforms, particularly suited for adaptive integrated solutions, are being used.

That type of integration approach covers solutions like systems management, operating systems, automation, virtualization software, development tools, and DevOps-enabling lifecycle, deployment, configuration and operational management tools, middleware, database software, cloud technology and many more.

An open-source agile integration approach relies on platforms, processes, and technologies that are more suited for adaptive solutions. With an agile integration approach, integrations can become a part of application development processes, including microservices, providing more agility. The integration plays a key role of distributed processes by providing a new approach of solutions. Combining technological capabilities with different organizational and process approaches makes the real transformation.

Implementing an effective service platform can ensure a higher level of safety, sustainability, and reliability of the critical power infrastructure. The internet accessibility makes it happens – big data and high level of cyber security solution are boosting the productivity via bright spectrum from mobile devices till data centers. In this way we can get easier access to the critical data reducing the waiting time and ensuring the proper working process of the environment. This is the pragmatic approach to increase the functionality of the provided energy services to the end customers taking into consideration the additional factors such as weather condition and consumption intensity.

Why the open-source solution has the most significant potential to generate cost savings in the energy sector? The open-source software is available for free use in the form of community-supported projects.

Additionally, it is offered in enterprise packages and is supported in bundles targeted to the business segment. This approach is familiar for many years on the market, and it's been recognized not only by the market leaders.

That idea of free software relays on the perspective, that by avoiding subscription fees, customers can save money in the long term. Significant number of studies proofed that higher operational costs are associated with self-support on community-based infrastructure software. On the other side, the cost of commercial subscription support, when that software is used in a critical field of activities, is significantly lower for the energy and transport sectors (this type of companies don't usually rely on large IT departments). The OPEX associated with maintenance of unsupported software is led by the need to maintain expertise on staff to stay close to the progress of the community. In addition to that - to apply fixes and patches to the infrastructure, upgrades in order to synch with the rapidly developed upstream code base. That leads to significant validation and testing costs.

At the current stage of development even the public cloud vendor offers services based on open source, and it would be reasonable to ask why any individual commercially supported open-source solution is a preferable alternative.

These operative costs could easily exceed the costs associated with a commercial distribution based on the relevant community solution.

The figures provided by one of the leading vendors in the field of open-source segment, the US-based Red Hat, proves 368% return of investment in 3-year period, 5-months payback time, 32% reduced infrastructure costs, 38% more efficient IT infrastructure teams, 21% more productive development teams, 63% less unplanned downtime.

The simple fact is that, unless you are a software supplier yourself, your core business is likely something unrelated to the enterprise software. The energy companies are getting better on improving the customer's experience about the power generation and distribution and focusing on improving efficiency indicators. Transferring the information about the grid status and the dynamic change of the indicators using the open-source approach over the internet of industry is the actual functionality of the system.

Winning businesses is not coming from the used software directly, but rather for what you build on top of infrastructure software, along with the reliability and additional services.

The commercial open-source community has faced the challenge that costs associated with long-term support are visible output in the organization's staffing costs, staff productivity and other indicators as time to deploy and uptime. In order to measuring these costs requires a long-term analysis. Therefore, the cost of a subscription is clear because the total shows up on a request or a purchase order. This is the reason that top management encourages the IT professionals in their companies' decision to use commercial products over community solutions or vendor-locked one.

There is a rising interested in applying data science to the energy transition, or more specifically, how to manage the balance and coordination of renewable electricity generators on the grid. Some common problems in this domain include electricity load planning, solar and wind generation (weather) forecasting, overall power systems modelling (to measure the performance of the grid as a whole) and battery optimization models (it's important to have intelligent systems managing energy storage solutions to maximize the benefits of renewables).

IV. Conclusion

Utility companies, project developers, public organizations, and other electricity grid stakeholders have a strong need for power system modelling in their work. As wind and solar continue to increase market share, the society needs to understand how to plan and operate

electricity grids with higher percentages of variable renewable power. This preliminary analysis is known as capacity expansion planning, which is a huge hurdle for some stakeholders. This is due to the fact that it is often resource-intensive, complicated, and time-consuming. There is a clear need for a tool to enable resource-constrained renewable energy advocates to test capacity expansion plans and create the data needed to back up their points. And the answer is open-source solution integrated in an agile way over the internet with the industrial components of the critical energy infrastructure.

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