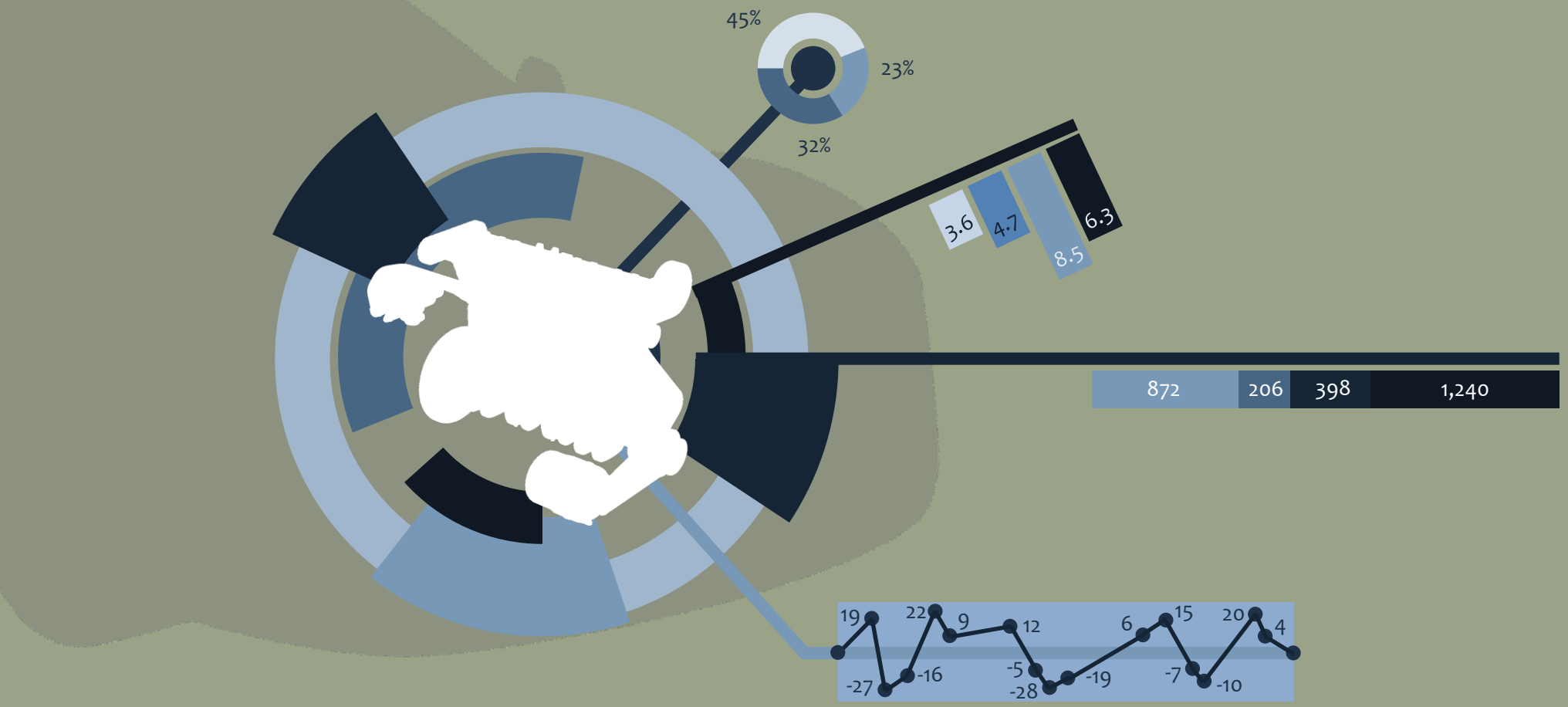
DELIVERING EXECUTIVE INSIGHTS ON AUTOMOTIVE PROGRAMS

STARTING FAST, ADJUSTING QUICKLY

LIFECYCLE **INSIGHTS**



EXECUTIVES' NEED FOR VISIBILITY IS GROWING

I need insight into product development. Now.

For anyone working in product development, that has become an all too familiar demand from executives in any industry. They want reports. They want visibility into the current state of programs. They want key metrics formulated to measure progress and support decision-making. While those efforts can be burdensome at times, the demand is certainly warranted. Today's technologies, processes and supply chains are overwhelmingly complicated and generate massive amounts of diverse data. As a result, executives are turning more towards metrics as a means to measure progress and root out operational barriers undermining success. They want an up-close look at the specific stages of the process, and they want it in real time. Yet, they also want a birds-eye view into the overall current state of the development.

In the highly-competitive automotive industry with increasing demand for localization and diversity, agility can mean the difference between success and failure. With shrinking time-to-market in an expanding global environment, the more pertinent the information executives have at their fingertips, the better they are able to understand and respond to business change.

While more transparency of product development is warranted, it isn't easy to deliver. The data generated over the course of developing a product is in a myriad of formats. It exists in a wide range of locations, on desktops, in emails, in enterprise systems. To make product development more transparent, not only must this information be aggregated intelligently into a composite view, it must be presented in the context of a product configuration or specific project. Finally, it needs to be visually depicted and delivered in a manner that executives can easily grasp and digest, that enables them to see the big picture while maintaining the ability to drill down into fine details.

Business Intelligence (BI) solutions are commonly used to provide insight for many different functions, but do traditional BI tools meet the specific challenges raised by product development? While BI tools excel at analyzing rows and columns, they lack capabilities to understand the dynamic data so common in product development. They also lack capabilities to traverse complex interrelationships between product development data. Overall, BI solutions have not kept pace with the complexity represented by the today's range of product definitions, configurations and development processes.

Product Development Analytics (PD Analytics) solutions, on the other hand, are built to manage the complexity of product development data. They pull on both core business data as well as the product development-specific content that is often held in unique formats from Product Lifecycle Management (PLM) and other technologies that organizations use today to manage their processes. PD Analytics solutions understand design and engineering data, even the rich information embedded within 3D Computer-Aided Design (CAD) models and simulations. They understand the context of all this data, including product configurations, to present metrics automotive executives require.

Providing more depth on all of these topics is the intent of this eBook. It takes a close look at what is driving the need for product development transparency and details the unique challenges of looking at product development data. Then it delves into BI and PD Analytics solutions, describing how they differ and how new solutions can deliver executive visibility into product development.

DESPITE RISING COMPLEXITY, EXECUTIVES NEED VISIBILITY

The automotive industry, like others, is undergoing dramatic changes. A number of trends are driving many new executive strategies, including the need for more insight into development.

TRENDS DRIVING DEVELOPMENT VARIABILITY

- **Business Diversification:** The current business environment is volatile for both Original Equipment Manufacturers (OEMs) and suppliers. In an effort to insulate themselves from such chaos, they are seeking new streams of revenues from an increasingly varied set of markets and industries. Consolidation continues to gain pace, and each acquisition creates the headache of integrating systems and absorbing data silos into the enterprise. This all translates to a broader range of product types and development processes and the need for homogenization to obtain economies of scale.
- **Development Globalization:** OEMs are setting up regional development and manufacturing centers to get closer, both figuratively and literally, to target markets. Likewise, suppliers are mirroring that global footprint to deliver more value and win more contracts. Furthermore, both are acquiring manufacturers for expertise and regional reach. All this means more people working on regionalized programs spread across the globe, making collaboration more difficult.
- **Pushing Engineering Responsibility Down the Supply Chain:** Today's vehicle systems are incredibly complex, requiring deep expertise in technologies that are constantly advancing. As a result, OEMs and suppliers are often outsourcing engineering and more down the supply chain to more agile and highly specialized organizations, thus dispersing critical experts around the world. Furthermore, suppliers are also increasingly required to own the development process for such systems and components, from specifications to certifications.
- **Increasingly Dire Consequences:** Warranty costs. Regulatory requirements. Materials compliance. Safety and other recalls. A problem with any of these could undermine a development program's success. A car manufacturer's inability to correlate forward sales vehicles with the impact of these sales on the supply chain BOM affects capacity and supply chain efficiency, causing delays in fulfillment and underutilization of available stocks. Mitigating these kinds of risks requires stringent quality processes, executive oversight and corrective action.

DESPITE VARIABILITY, EXECUTIVES MUST DELIVER

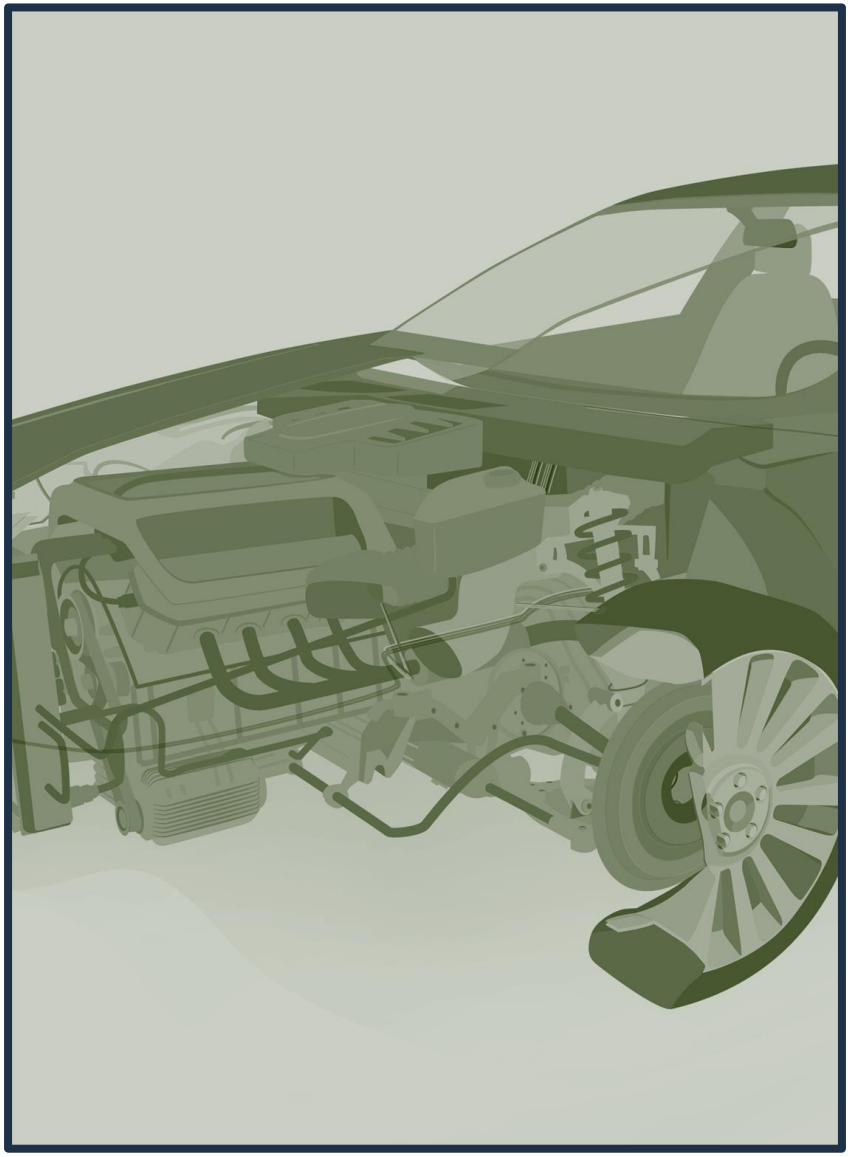
The takeaway? There is much more variability in automotive development programs than there has been in the past. Despite this fact, executives still need to ensure projects are completed on time and on budget. If companies fail in this regard, it directly affects their financial health. Therefore, executives need visibility into product development now. And they need it to be accurate.

Technology *can* provide a solution. Information systems that deliver transparency of product development do exist. Yet, the deployment of many such systems requires meticulous planning and a carefully executed deployment schedule. They often take time and intense effort.

Therein lies a problem. Despite this confluence of trends, executives get no respite from the traditional pressures of shorter development schedules and smaller development budgets. They need systems that can be deployed quickly and flexibly adjusted on the fly.

THE UNIQUE CHALLENGES OF GAINING DEVELOPMENT INSIGHT

Shortening time to deployment while maintaining flexibility is a must-have for providing product development transparency. But there are other factors executives must keep in mind. The data in product development is a rich source of information, but it is often embedded in complex systems and specialized formats. This section covers these topics in detail.



STRUCTURED DATA IS EASY TO ASSIMILATE

Product development produces a lot of structured data, text-based or numerical values such as test results that is typically easy to work with. Inventory information is often categorized in a standard way in Enterprise Resource and Planning (ERP) systems. Data and versions of designs are managed in a predictable manner in most PLM systems. Some organizations have long established spreadsheets for regulatory compliance that have been codified in specific formats.

In general, because it is already organized in a predictable fashion, structured data offers organizations an easy source through which to gain visibility in product development. The information is already organized, even though it might come in huge volumes. The trick is parsing and interpreting it quickly and in the right context.

THE UNIQUE CHALLENGES OF GAINING DEVELOPMENT INSIGHT

UNSTRUCTURED DATA IS VALUABLE, BUT DIFFICULT

Organizations, however, need to sift through much more than structured data. *Unstructured* data, such as videos or 3D models in PLM systems, is very prevalent in product development. This type of data, which can also take the form of text-based or numerical values, often results from the lack of an acceptable standard or template through which the information can be organized.

Requirements might exist in an indented list of sentences and numerical values. A Bill of Material (BOM) or product structure in PLM might have a column of suppliers written as a series of comma-separated lists. An ad hoc list of tasks and dates might be captured in a project management file. Overall, an organization's unstructured data can offer deep insight into how work actually gets done on a day-to-day basis. But getting a grasp on how it is organized so it can be understood is a common obstacle.

BOTH DATA TYPES NEEDED

Getting visibility into product development using either structured or unstructured data simply isn't enough. Combined, it reveals the actual state of product development. However, obtaining this composite view is far easier said than done.

The technologies that are part of a suitable solution must be able to marry structured and unstructured data, even if it comes from many different sources or exists in many different digital locations.

REAL VISIBILITY ALSO REQUIRES CONTEXT

While program or project transparency is useful, executives need such information within the right context. Consider a single part being scrutinized by three different executives in three different contexts. One executive needs to understand if a supplier's component has passed qualification testing. Another executive needs details about regulatory compliance for a component. Yet a third executive needs the status of several requirements for that same component.

One component scrutinized in three dramatically different contexts. So the executives' insight will come in three very different ways. Any technology solution that provides product development transparency for executives will need to deliver information in the right context.

CONTEXT COMES FROM DYNAMIC GRAPHS

The key to getting the context right is to filter the growing data from PLM and other systems through the relationships inherent within the product development process. In the prior example, the component has relationships to a qualification test, a regulatory compliance process, and several requirements. These types of relationships are everywhere in product development, between processes and designs, suppliers and stakeholders and so much more.

THE UNIQUE CHALLENGES OF GAINING DEVELOPMENT INSIGHT

As a whole, these relationships form complicated networks called graphs. And product development is practically *overflowing* with them. In fact, most of these relationships inherently exist in the data sources themselves. A PLM system, for example, already has a part number associated with a CAD model. Furthermore, these graphs are in no way *static*. They are highly *dynamic*, evolving quickly and dramatically on a day-to-day basis. Completely new relationships might arise all the time.

The ability to traverse continuously changing graphs, especially those inherent within the data sources themselves, in the correct context for reports and dashboards, is yet another capability any technology solution requires in order to be considered by product development executives.

DERIVED KPIS CRUCIAL, DRILL DOWNS CRITICAL

The raw information entered into any system or data source rarely contains the proper level of detail to offer executive oversight. As a result, many organizations have developed key performance indicators (KPIs), which are aggregated representations of low-level data. These metrics are often developed over a long period of time and crucial for gaining visibility into product development.

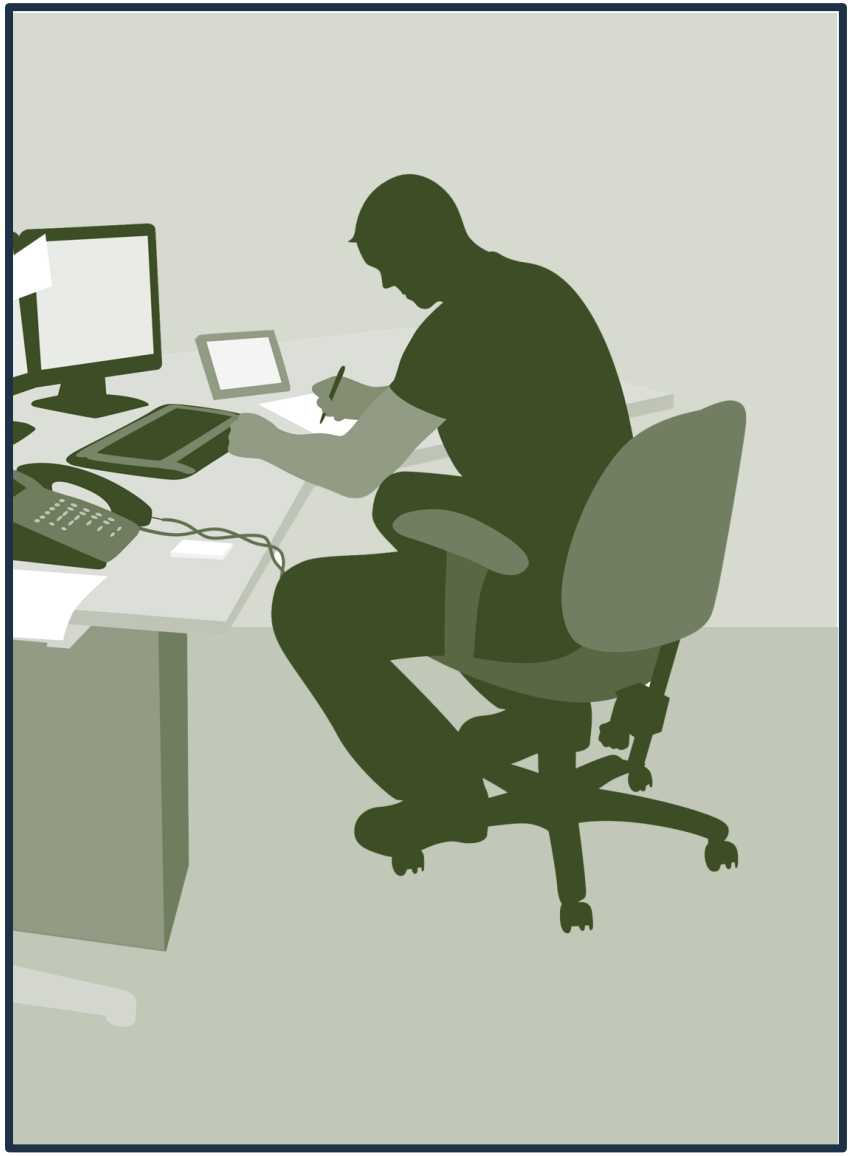
Executives' needs, however, don't stop there. As top-level KPIs raise red flags, management needs to drill down into the details to isolate the exact cause of the problem.

THE UNIQUE CHALLENGES OF GAINING DEVELOPMENT INSIGHT

KEY CAPABILITIES OF ANY SYSTEM

As evidenced by the challenges encountered when accessing product and process development data, to truly aid OEMs and suppliers, a solution that delivers product development transparency must have the ability to:

- Ingest and represent changes to all types of information, including structured and unstructured data or text-based or numerical formats.
- Aggregate all information, rolling it up or calculating higher-level executive KPIs, enabling the analysis of the "as-is" state of product development.
- Traverse relationship graphs (networks) to provide the right context for configurable reports and dashboards, which already often exist in the data itself, despite the fact that they are highly dynamic.
- Connect to all the sources of information, regardless of the location or format of the data, be it files or in enterprise systems.
- Predict the future KPI state and prescribe the best action to take in order to optimize the "to-be" situation.
- Present these KPIs and information sets in a single easy-to-use graphic manner, accessible to multiple departments, capable of drilling down to the lowest level.
- Be highly responsive and adaptable to changing needs, despite the source, amount and type of data being analyzed.



THE INFLEXIBILITY OF BUSINESS INTELLIGENCE

BI solutions are a set of technologies capable of transforming data into information that can be easily digested or consumed visually. At first glance, this type of solution seems like a good fit in terms of providing executives visibility into product development. However, it has a number of shortcomings that undermine its ability to deliver.

ARCHITECTED UPFRONT, INFLEXIBLE TO CHANGE

The configuration and deployment of most traditional BI solutions follow a similar path. The organization has planned how the technology is to be used. It develops and customizes an architecture or data model and then aggregates the relevant information into a single location, called a data warehouse, which is architected to handle specific kinds of data. The solution is then rolled out across the organization. Once deployed, the entire process must be revisited to modify the solution.

While this may work well in stable and unchanging scenarios, product development is a different reality. It is almost invariably in a state of *constant change*. Some automotive components or systems can undergo thousands of changes throughout the development process! One supplier may replace another. Milestones and deadlines may switch places and/or dates. Entirely new processes may be implemented depending on circumstances. New sources of diverse information may need to be incorporated.

DATA WAREHOUSE INTRODUCES CHANGE LATENCY

For BI solutions to work in 'Big Data' scenarios, disparate information must be aggregated from many different sources and brought together into a data mart or warehouse to be reported on. Reporting is against a copy of operational content and must be continually resynchronized to not fall too far behind the true picture. Any delay in this synchronization introduces inaccuracy into reporting. This is called change latency.

While this works for many business scenarios, it fails for product development. Consider the following scenario. In the morning, an engineer modifies the state of a change requirement from "fulfilled" to "unfulfilled" during the testing phase in a PLM solution. The data warehouse of the BI solution is not scheduled to synchronize with the PLM solution until midnight. An executive oversight committee meeting held at noon that same day would see the old status, completed, instead of the new status, incomplete. Such change latency is dangerous.

NARROW SCOPE OF DATA TYPES

BI solutions are built to handle the types of data found in financial and other transactional environments, such as ledger data coming from ERP systems. In particular, these quantitative data types are commonly organized nicely into rows and columns.

Data found in product development environments, however, come in a dizzying array of specialized qualitative formats. It could be 3D design data in a CAD format where viewing planes, hole locations and specific parameters must be extracted. It could be a presentation file used for a design review. It might be a requirements allocation spreadsheet containing configuration, functions and item assignments. BI solutions simply cannot process this diverse data.

THE INFLEXIBILITY OF BUSINESS INTELLIGENCE

INABILITY TO TRAVERSE DYNAMIC GRAPHS

With most BI solutions, a data model is initially defined as part of the planning process. As information is ingested into the data warehouse, pre-defined relationships tell the BI solution how pieces of information relate to each other.

Such a static approach, unfortunately, works poorly in a product development environment. It does not leverage the graph relationships that already exist within the data sources themselves. Furthermore, it cannot accommodate the ongoing changes that occur within these graphs. It is an inflexible representation that is a mere snapshot of the organization's best guess at the initial deployment of BI solutions.

TAKEAWAYS

In short, given the complex and dynamic nature of product development, traditional BI solutions can't provide complete executive insights. Their deployment model can't be easily adjusted for the changes that often occur. The data warehouse approach introduces change latency that results in out-of-date information. The inflexible data model can't traverse the relationship graphs of product development data, meaning the right context can't be provided.

Ultimately, executives need to have access to the real-time status of product development, whether it be project planning, change or issue intelligence. The limitations of BI systems undermine their efforts in this regard.

THE AGILITY OF PRODUCT DEVELOPMENT ANALYTICS

PD Analytics solutions are another set of technologies that work with large volumes of data and are specifically tailored to deliver the capabilities needed for product development environments. They differ from BI solutions in a few key ways.

INDEXING AND CONNECTING TO LIVE DATA

PD Analytics systems do not create a copy of data that then lives in a data warehouse. Instead, they identify the right sources of information by indexing *live data*. Next, they track and remember where the live source of information exists. Then, as needed, they pull data from those live sources so report data and information represent the current state of product development. Thus, there is no change latency.

INHERITING AND TRAVERSING DYNAMIC GRAPHS

In addition to live sources, PD Analytics solutions also pull the relationship networks, or graphs, that exist within those data sources. Those graphs can then be formalized into relationships within the PD Analytics system.

The underlying data model, therefore, isn't pre-defined and inflexible. Rather, it is dynamic and can change as the data sources change. This allows PD Analytics solutions to provide any context that is available for reports. But they also ensure that context gets updated as the data itself evolves.

HETEROGENEOUS DATA

PD Analytics solutions were built to work on heterogeneous data, which could be numerical-based, text-based or some other form of data. Furthermore, this data comes in highly specialized formats where information must be mined, including CAD, simulation and other data sources. PD Analytics solutions were specifically designed to effectively parse and present automatically the types of data generated in product development environments. They provide a unique point of access.

FAST SETUP, EASY CHANGE

The point here is that you set up the system to index data; you build relationships between the data and create dashboards. All this can happen within a couple of hours. In addition, you can easily make small or radical changes to those relationships and dashboards. In fact, the approach used with these systems is to get a minimal baseline defined and then evolve dashboards over time because they are so flexible.

TAKEAWAYS

Overall, PD Analytics systems have been built to deal with the complex data that is borne from product development. Because they understand the data, deliver insight with the right context, and can be quickly deployed and rapidly changed, they are the best solution for delivering executive visibility.

RECAP AND CONCLUSION

Executing automotive development programs is a highly difficult task today. Numerous industry trends are introducing more variability in the development process. That in turn introduces risks that executives *must* mitigate. They need product development transparency to identify and avoid problems early.

SIGNIFICANT BARRIERS TO REAL INSIGHT EXIST

Technology is a viable solution for providing executive visibility into product development, yet there are obstacles. Many such systems require a long planning and deployment schedule. Executives are faced with ever-shortening development schedules. They need systems that can be stood up quickly and flexibly changed.

Hurdles also exist in the myriad of structured and unstructured data, including 3D models with embedded information, generated during product development. Transforming such data into practical insights requires context, which can vary from a specific product configuration to a particular compliance process and far more. Such context is gained by navigating the complex interrelationships, called graphs, of development data. Any analytics solution must be able to deal with these data realities.

THE INFLEXIBILITY OF BUSINESS INTELLIGENCE

Though BI systems may seem a logical choice to offer this insight, they have drawbacks. They cannot handle the complexity represented by the range of product definitions, product configurations and product development processes. Without this critical context, reports and dashboards are useless.

THE AGILITY OF PD ANALYTICS

PD Analytics systems have been built to deal with the complex data that is borne from product development. Their ability to understand product development data, provide visibility in the right context, and be quickly deployed and rapidly changed makes them the right solution for delivering executive visibility into product development.

FINAL TAKEAWAYS

A live, birds-eye view into product development is often hidden from executives at automotive OEMs and suppliers, as this information is globally dispersed and resides in a number of complexly formatted files in PLM and other systems. Because they were designed to address just such challenges, PD Analytics solutions are the best answer to deliver transparency for executives.

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