How Intelligent Can Systems Get?

You Start Here

The question of how intelligent supply chain planning systems can get, really depends on defining what *intelligence* is. Intelligence is a relative measure and a moving target. In the early days of AI, intelligence was defined by some as machine having a conversation via a keyboard with a human being each located in a different room without the human knowing about the presence of the machine. As it relates to supply chain planning systems, we define intelligence as the ability to predict the outcome under different circumstances and/or construct scenarios to get the desired outcomes.

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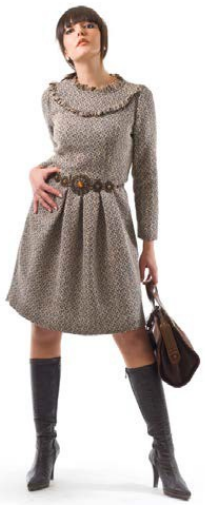
Did you say a Model?!

To be able to do this, one needs to learn and know the characteristic of the environment. We call this the *model* (understanding) of the world we are operating in. The more detail we

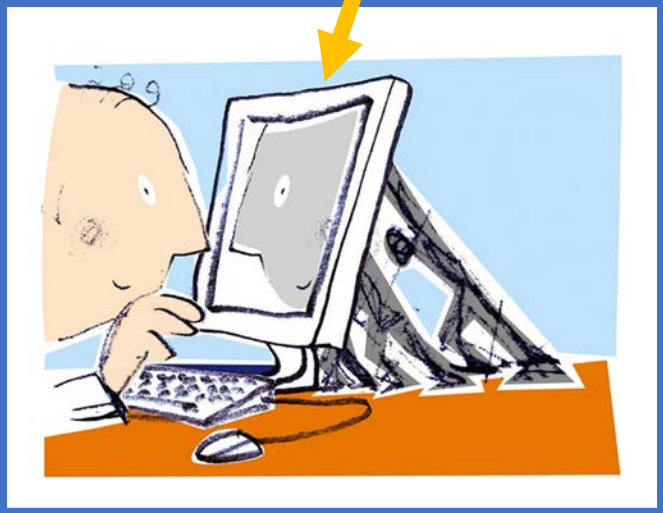


know the more we can learn and deduce conclusions and predict the outcome. A very simple example is your commute-time to work. This can be programmed in a simplistic model as (say) 30 minutes on average.

With more detail understanding, it would take a lot shorter on school holidays or the use of HOV lanes. A bicycle might be another choice but not when it is raining! These choices are just a few of all the possibilities that you might have. A learning system learns and uses this information in order to predict the commute time. This can only happen if we have a detailed knowledge of all the attributes and possibilities that exist.

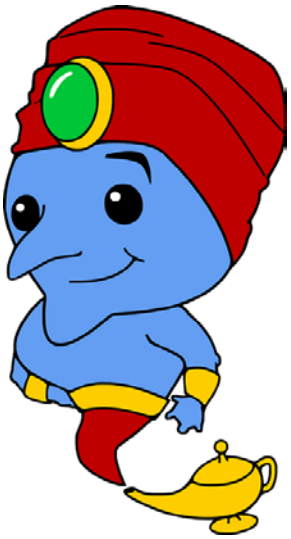
INTELLIGENCE INGREDIENTS

1) The ability to *accurately* and in detail model the complexity of the environment. We call this the Digital Mirror© of the supply chain, and



2) the ability to *learn* from its experiences, i.e. data from the past and future (planning data).

A Genie?!



Learning systems have a great property: the more you use them, the better they get. Just like a person who has worked in the company for many years and understands the intricacies and complexities of the processes, vendors, customers and products organizational issues, what we collectively call domain expertise.

Adexa *Genies*, are distributed and independent processes, intended to have such *domain expertise.* They mold themselves and learn about what should be done and how it should be done in order to optimize the outcome. One of the key features of Adexa architecture is Attribute-Based Planning (ABP). Attributes are details of all the objects in the supply chain from tools to equipment to customers, suppliers, regions, products or even operational policies such as carbon footprint of the products and equipment. Imagine a baby growing up, she relates to different people and different items based on their attributes that are of any relevance to her. For example, milk bottle has attribute of milk, and crib has attribute of sleep (most of the time!).

… *attributes* are used to accurately represent every aspect of the supply chain and its true digital replicate to which we refer to as Digital Mirror©.

How does it work in a Supply Chain?

Intelligent systems, in the same way, learn about attributes and identify with them accordingly to become more and more mature. For example, by understanding the delivery trend of a supplier, one can optimize production to make sure the deliveries are made on time. A pre-defined lead-time can potentially lead to inefficiencies. A system that is constantly watching the delivery trend can adjust to the vendor and either raise a flag to tell the users or adjust the committed dates to the end customers according to the changing trends. This approach can result in significant savings and much better customer service.

WHO is Responsible for This?!!!

Understanding the root causes is another sign of intelligence. By uncovering the cause of an event (desired or not) one can use this information in order to either promote or prevent the event. Consider a static system that is programmed to assume a resource availability as 80%. *In reality, the equipment availability might change during different seasons or may depend on the product mix or it may even deteriorate over time*. In a learning or dynamic

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system, the change can be observed and adjusted accordingly. Through constant observations and recognition of patterns, it learns that it is much lower than 80% in winter. This is valuable information to adjust the model of the world to dynamically adapt to what is real. Hence a more accurate model and therefore more accurate outcome of the plans.

Once an observation is made and pattern is recognized then the system can look for causes. For example, by comparing breakdown times and scheduled maintenance, it may find that maintenance is not done as required. Hence corrective action can be taken. These kinds of dynamics are an integral part of any real-world model and need to be taken by supervising systems (people or otherwise). ***Intelligent systems can therefore observe and adapt to their environment.*** Adaptive systems are often intelligent since by doing so they can achieve their desired outcome for survival and optimizing their performance.

Finally, it is over!!!

In summary, intelligent systems, can model the world accurately, they can get better, they can find causes and they can adapt to autonomously accomplish the desired outcome. They have the capability to identify the changes in a very complex and dynamic environment, they identify the trends (good or bad), they identify and recommend solutions that can optimize the desired outcome for the end users once the cause is found or a pattern has been observed. Only this way can the enterprise adapt to the on-going dynamic changes of the market, suppliers, competition and organizations. These are the properties of an *autonomous supply chain planning system*. For more information on this topic and related subjects go to Here.

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