



# DIGITAL TWIN: THE FAST LANE TO DATA-DRIVEN POLICYMAKING





## The increasing complexity of public decisions and the cost of suboptimum policies

Public policy has become increasingly complex and dynamic. Quick responses were asked from policymakers on the ongoing crises threatening Europe, e.g. COVID-19, climate change and the more recent energy and inflation crisis.

While there is a willingness to build more “data-driven policies”, we have witnessed during these crises that data is scattered, often not qualitative and thus not readily available for decision makers. This implies that policies still tend to rely too much on feeling and preference rather than data.

In this article we review the concept of the digital twin and how it can help policymakers create more data-driven policies. Moreover, we draw a parallel and try to learn from industries where digital twins are already widely adopted like the manufacturing and chemicals industries.

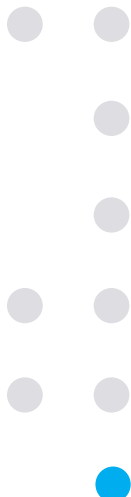


## What is a Digital Twin?

**Houston, we have a problem...** In 1970, the flight of Apollo 13 turned into a famous rescue mission. As the world held its breath, a NASA team resolved the technical issues from 200,000 miles away with the help of a digital twin model of Apollo 13, allowing engineers to test possible solutions.

While the Apollo mission happened more than 52 years ago, we have recently seen widespread adoption of digital twins in manufacturing. In manufacturing digital twins are used as **virtual representations and digital counterparts** of real systems. For instance, a wind turbine company is using digital twins of their wind turbine to measure wind speed, rotation speeds, temperature, vibration and much more sensor information to keep the wind turbine operating optimally and predict when maintenance is required for critical components of the wind turbine.

In process manufacturing, digital twins are deployed to help managers understand how factories work. Moreover, the overall **yield** of the plant can be increased by structurally optimizing the setpoints in this production process. The impact of continuously optimizing setpoints has shown to be significant. SAS has worked with process manufacturers who have been able to increase the yield of their production process by several percent points, which has a huge impact on their plant's profitability and sustainability.





## Can Digital Twins increase the Yield from Tax Euros paid?

At first glance, the digital twin of a wind turbine or a plant has nothing to do with public policy. And yet the concept is very much replicable. For example, it could be interesting to deploy a digital twin model to simulate and to optimize the setpoints of policy decisions in order to **develop better and more accurate policies**. The idea here is the same as in process manufacturing, can we increase the yield from tax money by increasing the effectiveness of public policy by several percent points?



Public policymakers also begin to look into the concept of digital twins. Areas where digital twins are being explored include border agencies and tax authorities. Networks of digital twins can even cover entire cities.

Some advantages of digital twins for public policy could be:

- **Higher explainability:** support policymakers in objectively explaining the rationale behind public policy.
- **Finding more optimum (policy) solutions:** thereby spending tax money in ways that are more beneficial to society (increasing the yield from tax money).
- **Agility and rapid response to crises:** having digital twin models in place, would mean policymakers have the tools to quickly understand the impact of policies in crisis situations.



## A digital twin for FOD Financiën

The Belgian ministry of Finance (FOD Financiën) uses a digital twin to model the impact of policy on taxes and incomes of individual citizens. Using Artificial Intelligence, new policy texts are interpreted, new business rules are derived, and automatically the impact of the policy on individual citizens becomes clear. This helps FOD Financiën to quickly understand the effect of decisions and come up with optimized, targeted, and ultimately better data-driven policies.

**Watch the video:** “Profiling the Winners and Losers of New Regulations”

Dierk Op 't Eynde, Senior Data Scientist at FPS Finance, describes some of the technical considerations of Aurora, including how the team created a digital twin.





## How to get started?

Based on our experiences working with private and public companies in building digital twins, we list four recommendations:

### 1. Start small

While the ambition to turn an entire policy domain into one large digital domain could be the ultimate goal, it is important to build the first version of a digital twin in a small (sub)domain and iteratively expand the digital twin model into a broad domain.

### 2. Work in mixed teams

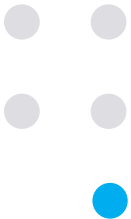
Successfully building digital twins requires expertise from business and expertise from data analytics. So it is important to bring together teams with mixed expertise.

### 3. Manage your data - Garbage in Garbage out

The saying 'garbage in garbage out' also applies to digital twins. When data is of low quality, or missing values are not correctly imputed, the digital twin will be useless and even provide false output. It is therefore highly recommended to apply data management principles and have the right data management processes in place to address data quality.

### 4. Focus on continuously improving decisions

Too often public data projects are treated as one-offs, integrating data sources on an ad hoc basis to provide an insight requested by a policymaker. However, to harness the full value of the digital twin for public policy, the data must be constantly updated and the digital twin must be constantly improved to help develop the best data-driven policies and increase the return on citizens' tax money.





As global leader in analytics, SAS provides technology and expertise that helps governments improve public policy. **SAS Viya** brings end-to-end capabilities to build digital twins, from data to predictive modelling to simulation and decision making.

In the SAS philosophy, the policymaker as end user must be able to work with the data. We call this the citizen data scientist.



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