



## DACADOO RISK ENGINE

Enhance your underwriting efforts.  
Risk Automation and Data Estimation with dacadoo.

## GAME CHANGER

If you look at the history of underwriting, it is easy to point to the moments of change. Sex, smoker/non-smoker, diabetes, HIV... all pivotal to changing not only who got insurance, but how much they would pay. But those changes came at a cost, not just to the consumer, but to the consumer experience too. The greater the number of variables that are needed in order to determine the health risk, the longer the buying process takes. Now companies all push to simplify the process in order to decrease the issuing time. And that's where dacadoo comes in. Its Risk Engine is based on a broad set of scientific studies to support automation in underwriting that takes mere seconds.

## MORE THAN A SCORE

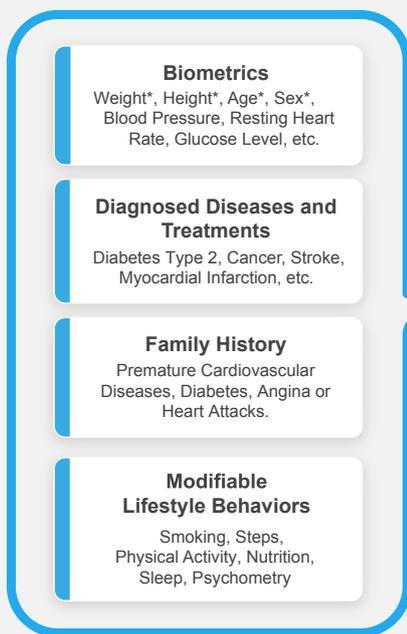
This ability to take a wide range of health and lifestyle data and narrow it into granular detail that supports overall health risk is what makes dacadoo's Risk Engine a game changer for the life insurance industry. The Risk Engine is more than just a score. It provides estimations for mortality, morbidity, and many other data points that are not normally provided.

## HARNESSING THE POWER OF DATA ANALYTICS

The dacadoo Risk Engine is based on more than 300 million person-years of data from scientific research. Our Risk Engine processes more than 90 data points, grouped into four categories: biometrics, diagnosed diseases, family history and modifiable lifestyle behaviours. With as few as four data points — height, weight, age, sex — the Risk Engine produces full estimation sets with 70+ values for each person, since it uses imputed values — conditional expectations — for what is missing.

The result or output? 90.2% [ROC AUC\\*](#) in under a second. These estimated values include the risk of a person dying from several diseases (mortalities) and getting sick from several diseases (morbidity), as well as missing data values. Therefore, insurers can implement accelerated underwriting with the help of our Risk Engine.

### Inputs



### Outputs\*\*



\*Only these four biometrics are needed for the dacadoo Risk Engine to operate.

\*\* Includes imputed values for up to 70+ health data variables that are not provided as an input. A number of these outputs have confidence intervals.



# UNDER THE HOOD

The Risk Engine is based on more than 300 million person-years of data from scientific research and provides robust and broad insights. It estimates the relative risk for a particular target population.

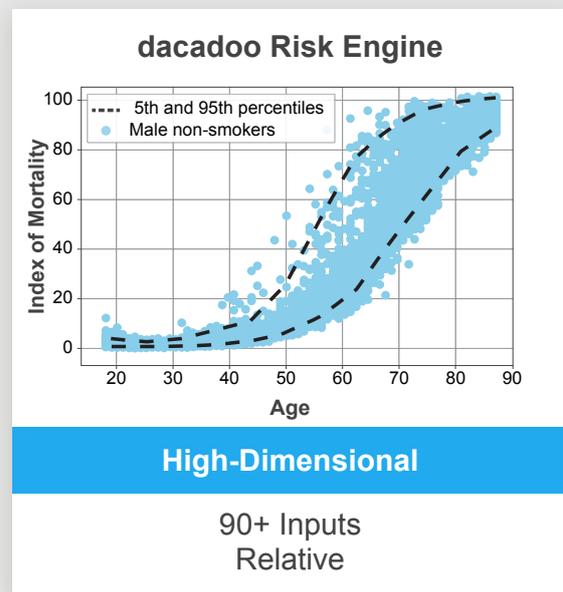
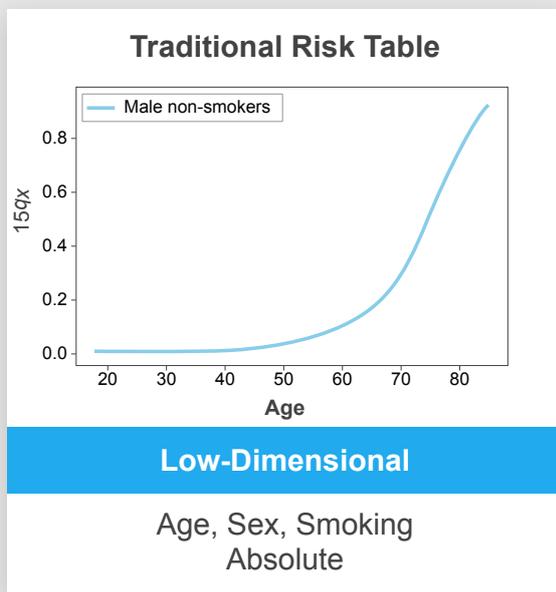
## The Risk Engine at work

Let's say you need to know someone's fasting blood glucose. You could order that specific test, but doing so costs both time and money. Alternatively, the Risk Engine can estimate it based on sex, age, height and weight, as well as additional optional inputs such as alcohol consumption and an existing diagnosis of type 2 diabetes.

Profile	
Age	34
Sex	Male
Height	168 cm
Weight	74 kg
Smoking	<ul style="list-style-type: none"> <li>• Current smoker</li> <li>• Former smoker</li> <li>• Years since quitting</li> <li>• Number of units per day</li> </ul>



The Risk Engine helps standardise risk assessment among insurance companies, utilising a model of multivariate continuous output of risk assessments. Its 90.2% ROC AUC means underwriters can augment their view on risk, and focus their skills on more complex cases. By using its current actuarial risk table as a baseline, the insurance company can overlay the Risk Engine's high-dimensional risk estimates, giving the company data to support its assessments.



The Risk Engine's risk ratio complements the company's traditional risk table by comparing the risk between an individual and a population. The population is defined in such a way that it reflects the relevant dimensions of a baseline model. The baseline model can be defined by the insurer, by using age, sex, and smoking status, for instance. The Risk Ratio then expresses additional dispersion to the baseline model.

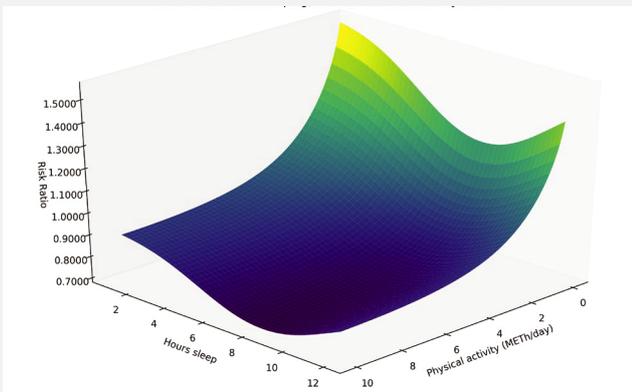
$$\text{Risk Ratio} = \frac{\text{Risk Index}_{\text{individual}}}{\text{Risk Index}_{\text{population}}}$$

The result? The Risk Engine provides the best of both worlds: a model that is both high-dimensional and absolute. Add in the speed (it only takes a matter of seconds), and you can see how the Risk Engine solves the cycle time to issue dilemma. Finally.

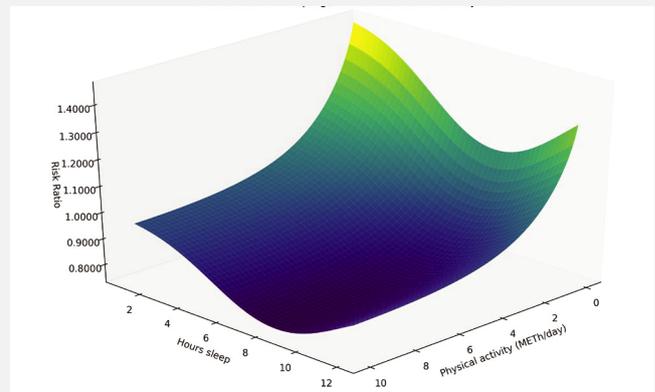


The dacadoo Risk Engine is accessed via our Models API, which is stateless and has been designed specifically for detailed, granular risk assessments. Through our Models API, customers have the choice of whether to use only our Models Risk Engine API or whether to also make use of our Models Health Score API, if they wish to integrate our Health Score technology within their product offering.

Our Risk Engine can assist insurers with the design of products that include risk from lifestyle data, such as movement and sleep. The plots below show the sensitivity of the risk to sleep and movement expressed as a ratio. Clearly, lifestyle data matters. And with the dacadoo Risk Engine, insurers can quantify it.



Female: The relationship between sleep, movement and mortality



Male: The relationship between sleep, movement and mortality

## SO WHAT'S NEXT?

### New Features

Our newly released Risk Engine 1.4 includes interview guidance as a new key functionality. With our interview guidance feature, insurers will be advised which are the next best questions to ask the potential policyholders while undergoing the underwriting process. For this purpose, the Risk Engine provides the expected uncertainties of estimation for groups of questions, and insurers can prioritize questions where the uncertainty is high. No more burdening and churning applicants with questions that are less likely to reduce uncertainty! Additionally, an endpoint for COVID-19 susceptibility

has been added. This endpoint estimates mortality if the disease is contracted.

### Pay-As-You-Live

So what's next? The logical next step is to combine the Risk Engine with dacadoo's Digital Health Engagement Platform, bringing you the opportunity to offer a Pay-As-You-Live insurance product. The Digital Health Engagement Platform helps people manage their health by tracking their body, mind and lifestyle data through gamification and activities. For more information about dacadoo's Digital Health Engagement Platform, [please click here](#) or contact us.



\*ROC AUC: [https://en.wikipedia.org/wiki/Receiver\\_operating\\_characteristic](https://en.wikipedia.org/wiki/Receiver_operating_characteristic)

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## ABOUT DACADOO

dacadoo licenses its Digital Health Engagement Platform, including its Health Score, to life & health insurance operators (B2B), supplying Insurtech and health-tech solutions to over 35 of the top 100 life & health insurance operators globally. Available in over 16 languages, dacadoo's technology is provided as a fully branded, white-label solution. Alternatively, it can be integrated into customers' products through its API. Thanks to its "Connect, Score, Engage" offering, dacadoo supports life & health operators such that they can motivate their clients to lead healthier lifestyles through its SaaS-based Digital Health Engagement Platform. dacadoo also provides its Risk Engine, which estimates relative risk regarding mortality and morbidity in real time. dacadoo has over 115 employees across locations in Europe, North America and Asia-Pacific, and over 100 filed patents around their digital life & health solutions.