

## Bravent creates agile, scalable industrial vision solutions powered by Intel® Geti™ platform and OpenVINO™ toolkit

IT consultancy Bravent developed an efficient, flexible AI-based computer vision solution to reduce human error in complex machinery assemblies, which can be scaled and adapted across a range of industries.



### The challenge: Inefficiencies in AI training

Across the globe, a growing number of industries are using AI to make operations and production more efficient, flexible, and reliable.

One of the key issues for data scientists and digital transformation experts is the time, human interaction and computing power required to teach AI to perform a new task. When it comes to designing effective machine learning solutions that are commercially sound and scalable, the development process needs to be faster, more streamlined, and adaptable – which is where the interactive Intel® Geti™ platform becomes essential.

Intel technology customer Bravent – a digital transformation consultancy – had been tracking global trends in AI adoption for some time. They noticed an increase in demand for integrated AI computer vision (CV) within client workflows across their core sectors of manufacturing, energy, construction, tourism, and sports. Many businesses were seeking to optimize pipelines and solve problems in quality assurance and process improvement through AI. Bravent recognized an opportunity to push their CV innovation further and set about developing more efficient ways to train their AI models, with support from the Intel Geti platform Early Access Program (EAP).

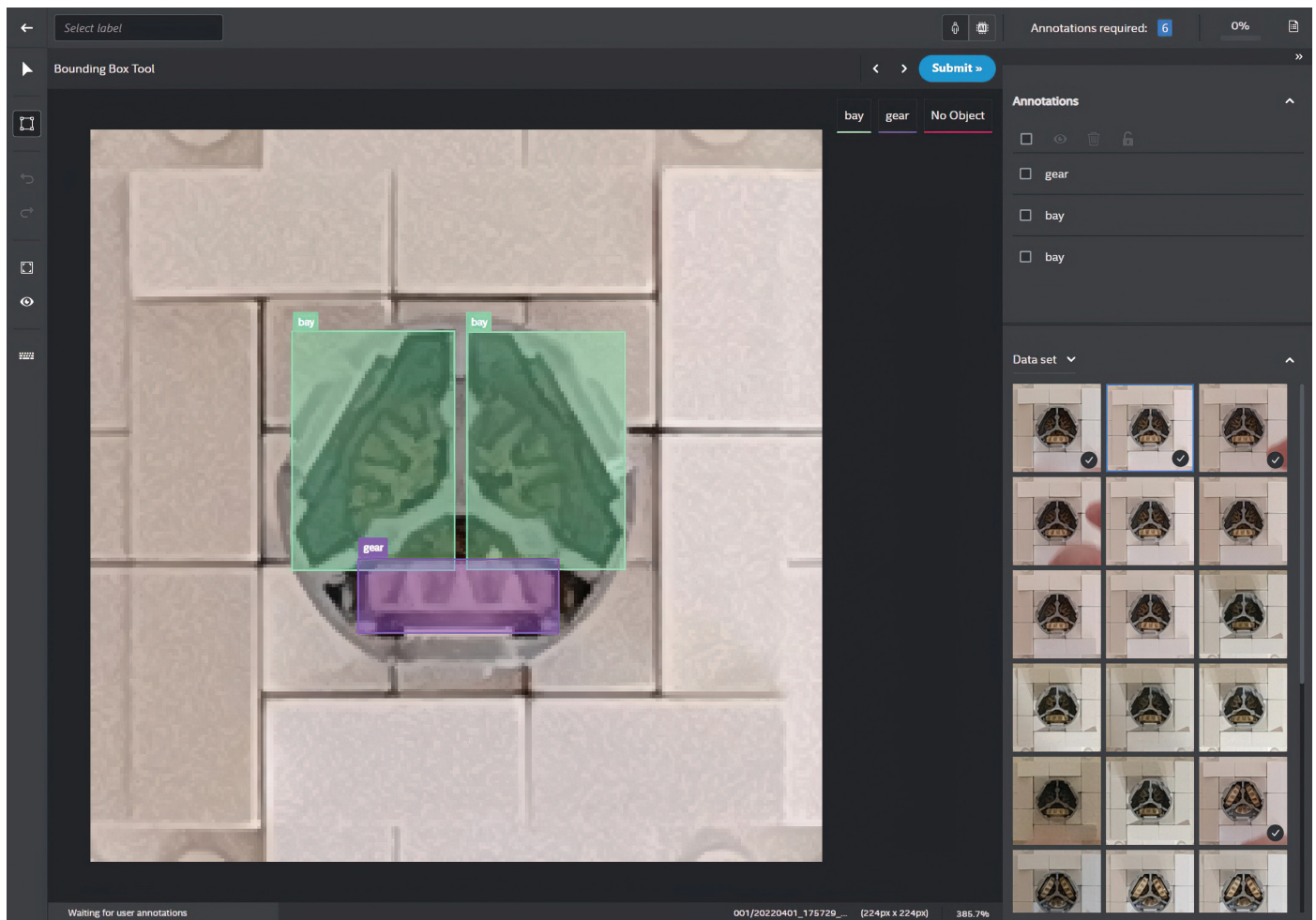
### The Bravent solution: Accelerated AI learning powered by Intel Geti platform

Bravent's Innovation Lab had started working on a proof-of-concept machine vision solution in 2020, for a client in the agricultural equipment manufacturing sector. The main problem the client faced was quality assurance (QA). On the factory floor, one single mechanic or operator had to follow more than 40 steps to place more than 90 different parts in roughly two hours at least four times a day without mistakes. They needed an automated method to support the QA process across all assembly processes and help to mitigate human error – in real time.

Prior to Bravent's automated solution, the manual assembly chain required an engineer to collect all necessary machine parts, then verify the precise quantity of each one using an expensive sensor table. Bravent developed around 20 computer vision models to replace this high-cost and time-consuming step. However, each model required specific labelling for each of the images used in their training and the platform Bravent was using to train their AI models was simply not fast enough.

#### At a glance

- Streamlined AI model development for industrial vision initiatives
- Customer expands offerings with new custom model development capabilities
- Analytics platform applies computer vision models on edge devices to send results in real time and produce actionable insights
- Achieves measurable improvements in QA for agricultural machinery manufacturer
- The Intel Geti computer vision AI platform enabled data labelling, model training and optimization



**Figure 1.** Intel Geti platform's interactive AI, powered by active learning and a human-in-the-loop approach, helped to reduce annotation efforts and enable Bravent's models to learn faster.<sup>1</sup>

Bravent benefited from early access to a pre-production version of Intel Geti platform through the EAP, including access to a powerful server and graphics card that enabled CV model training on premises – and a tablet that made labelling images easier and quicker. Equipped with these products, Bravent set about testing possibilities for image analysis at the edge, with the aim of achieving speeds close to 30 frames per second (fps).

Bravent's model architecture was optimized for inference on the edge using the OpenVINO™ toolkit and tested with an Intel® Neural Compute Stick 2 (Intel® NCS2), Raspberry Pi and Ubuntu, and an Intel® Core™ i7 processor on a Microsoft Windows-based laptop. The QA process requires a camera to be placed at a specific location in a work cell to record the machinery assembly. These images are sent to previously trained models and the application is responsible for verifying that no parts are missing, that the correct parts have been used, and that the assembly steps have been performed in the correct order by front-line employees in the factory. Finally, Bravent's industrial vision solution sends these validations and verifications to the factory's quality control department via integration to their applications, for insights and decision making.

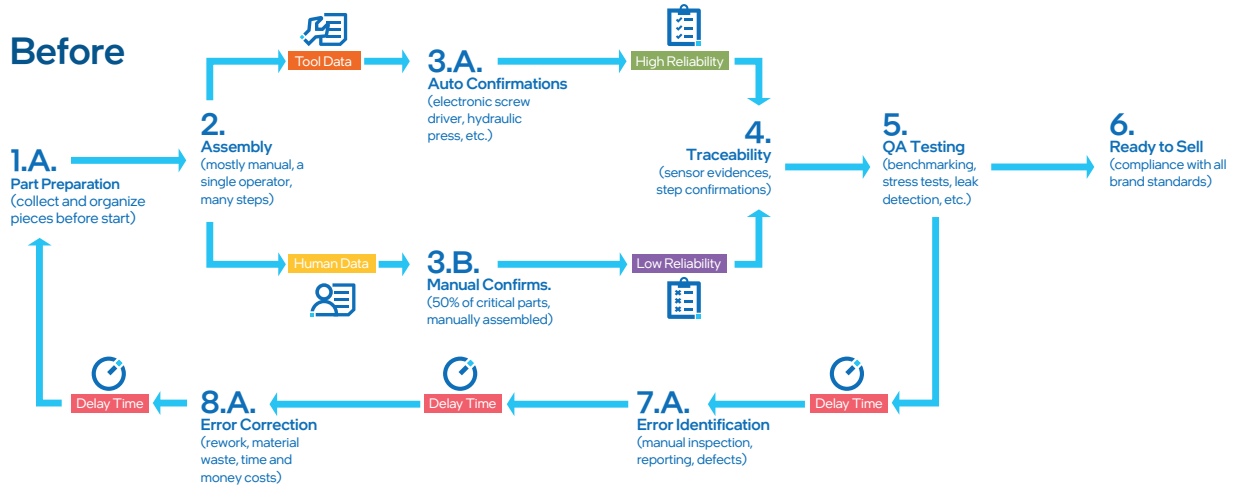
Bravent replicated the assembly cell in their innovation lab to simulate the manual assembly process, and used the Intel Geti platform to develop object detection and image classification models. Once this proof of concept was established, Bravent devised a mechanism to collect data from a real assembly line – enhancing their prototype with computer vision models developed using Intel Geti platform and real application data.

Intel Geti platform enabled the team to create multiple computer vision models and train many models with hundreds of images rather than a single complex model with many thousands of images. This reduced training time and the number of false positives, and it minimized any problems with data imbalance.

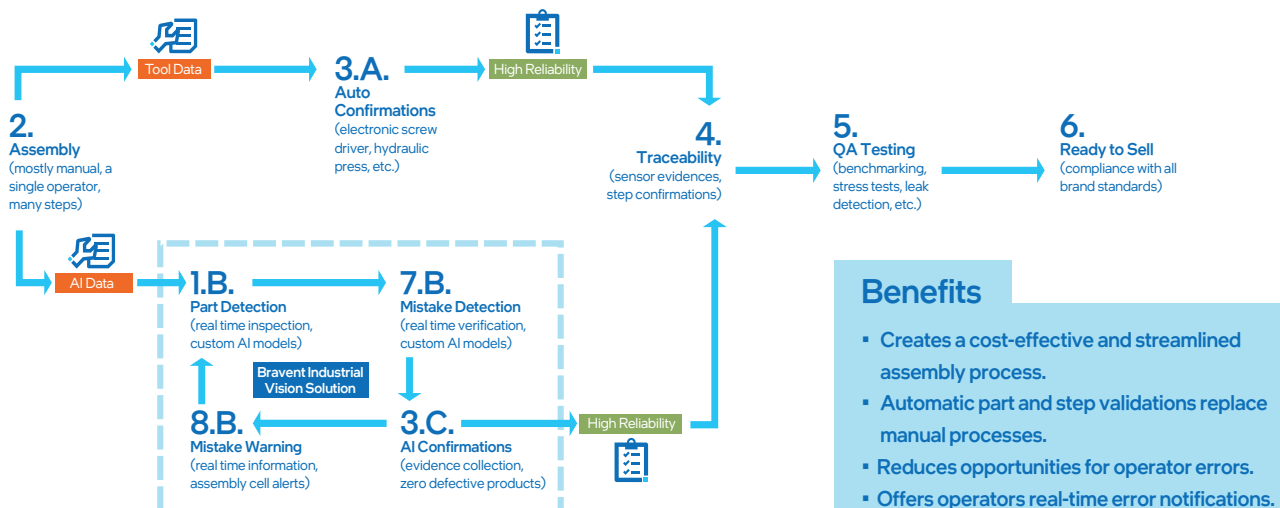
*"More than allowing us to solve a problem, Intel Geti platform has helped us take our solution a step further – making it more efficient, adaptable to different business needs and cost-effective."*

- Sergio Velasco, Edge Computing and Internet of Things Technical Lead, Bravent

## Before: Bravent Industrial Vision Solution



## After: Bravent Industrial Vision Solution



### Benefits

- Creates a cost-effective and streamlined assembly process.
- Automatic part and step validations replace manual processes.
- Reduces opportunities for operator errors.
- Offers operators real-time error notifications.

Bravent used computer vision AI to add an automated mistake detection step in the assembly process, helping to improve employee productivity and reduce errors in assembly quality.

The Intel Geti platform's intuitive user interface made it easy for Bravent to manage their entire model development project in the platform – from data annotation and training to optimization and retraining. The Intel Geti platform's smart annotations allowed users to select pixels and label images, especially when using a touch-screen tablet.

Bravent found the Intel Geti platform's UI so intuitive that the team was able to split the data annotation and training tasks between their own consultants and the client's employees. Involving the client in the entire AI model development process, a human-in-the-loop approach, ensured their client's specialist knowledge informed the AI training. It also freed Bravent up to solve problems in the factory in a more agile manner and work to scale the solution.

In addition to the Intel Geti platform, OpenVINO toolkit was central to the success of Bravent's solution. OpenVINO toolkit provided the framework that allowed Bravent to optimize their models for the edge and send results in real time directly to the factory, without having to send data or do processing in the cloud.

## Results: Real-world integration and impacts

Bravent wanted to test whether they could use the Intel Geti platform to generate AI models with greater speed and agility and put their industrial vision solution into production faster than before.

The real-world problem they faced was how to monitor very complex machinery assemblies in a factory, to validate that the parts and steps are being executed in the right order and in the right way – in real time.

### Manufacturing industry benefits

#### Safety

Promotes safety, as Bravent's computer vision solution is able to detect objects it is trained on to help prevent accidents.

#### Quality

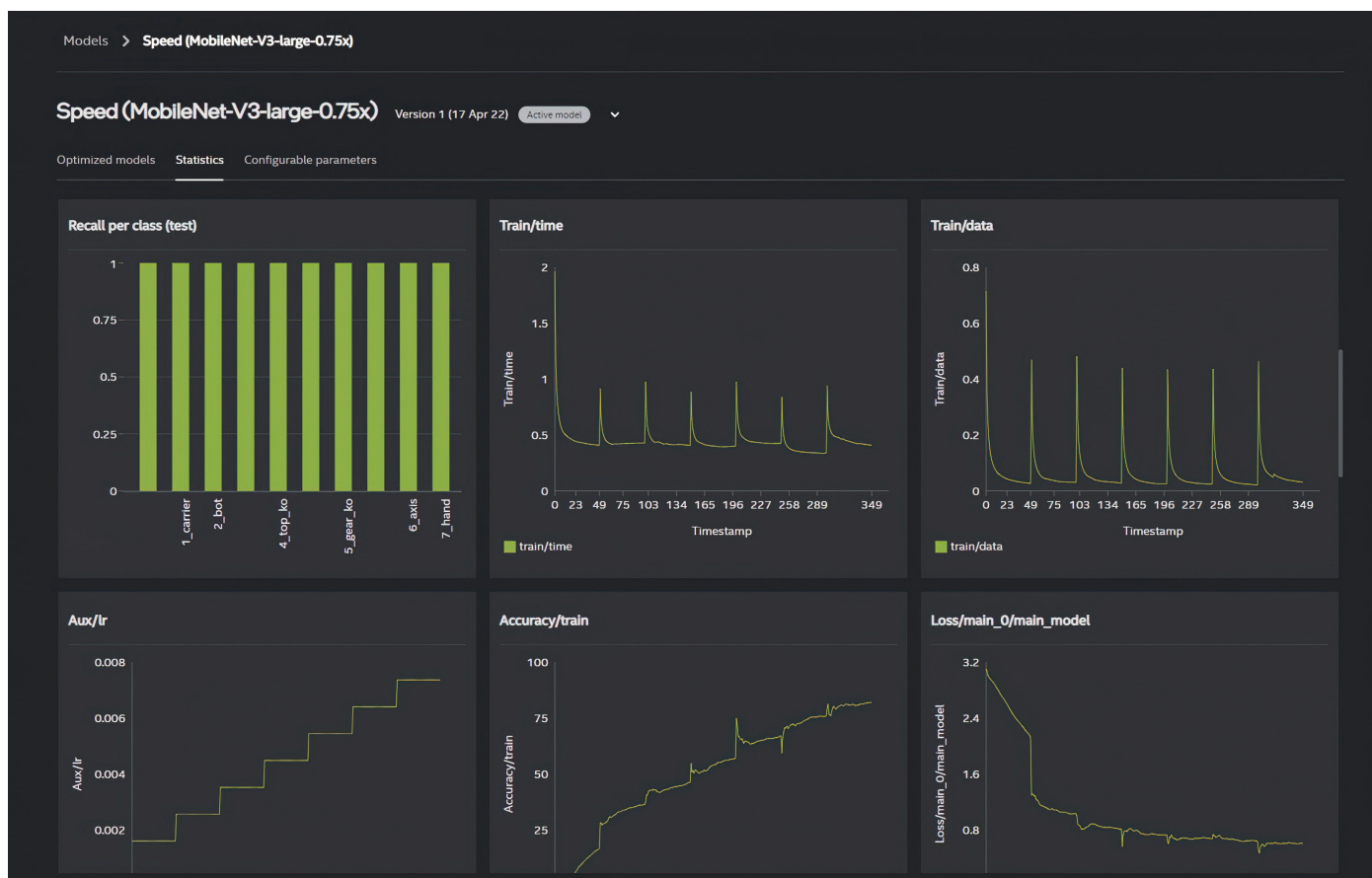
Improved quality thanks to algorithms that allow verification that assemblies in a chain are being carried out correctly – helping to detect problems before they occur.

#### Production

Fast presentation of validation results, minimizing delays in the production chain.

#### Productivity

Increased employee productivity as people can be deployed on other tasks.



**Figure 2.** Bravent engineers and data scientists were able to access all model statistics within the Intel Geti platform, enabling them to verify when their models were ready to use.

Compared with the platform Bravent previously used, the Intel Geti platform saved time in labelling images and training, reduced the number of people performing repetitive training tasks and sped up the work of model optimization and deployment. Working with the Intel Geti platform increased productivity and allowed Bravent to focus on software development and the creation of new applications, products, and solutions.

By reducing the overall model development time – including data annotation, training and optimizing models – Bravent can get their solutions to market faster.

*“With the Intel Geti platform, we can train and optimize models easier and faster, and go to production with those models in a very short time.”*

- Sergio Velasco, Edge Computing and Internet of Things Technical Lead, Bravent

## Conclusion: A scalable solution for quality control and more

Early access to Intel Geti platform and the use of OpenVINO toolkit was crucial to improving the speed and process effectiveness of Bravent’s AI model training. It was also key to the success of their model optimization for real-time use directly on a range of devices, close to the data source at the edge.

Bravent sees opportunities for their innovative solution in more industries. By incorporating other artificial vision models, Bravent hopes to address other challenges such as predictive maintenance, collaborative work between operators and machines, detection of safety elements, and health and safety equipment at work, supported through their technology partnership with Intel.

## Learn more

Find out how Intel Geti platform can help your organization easily build AI algorithms at [geti.intel.com](https://geti.intel.com)

## Additional resources

To learn more about Bravent and their Industrial Vision Solution explore these resources:

- [The Bravent Website](#)
- [Bravent’s Industrial Vision Solution Website](#)

Learn how additional Intel® technologies can help you build and deploy AI applications at scale.

- [Intel® Distribution of OpenVINO™ Toolkit](#)
- [Intel® AI](#)



<sup>1</sup> Testing completed by Bravent in August 2022. Intel Geti platform pre-production version.

Performance varies by use, configuration and other factors. Learn more on the [Performance Index site](#).

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary.

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