CHANGE2TWIN

DIGITAL TWIN CHAMPIONS IN MANUFACTURING

SUCCESS STORIES FROM CHANGE2TWIN PROJECT 2020 - 2024

HORIZON 2020

CHANGE2TWIN OPEN CALLS AND FINANCIAL INSTRUMENTS

The Change2Twin project offered European manufacturing SMEs and midcaps (companies with up to 3.000 employees) funding to get ready and create a digital twin. For this purpose, Change2Twin organised two rounds of open calls where companies could apply for funding. The first batch of the open calls took place in 2021, the last round ended in 2023.

In each open call Change2Twin offered two different instruments:

- Assessment voucher (up to € 10.000 / project) via Assessment Open Call
- Deployment voucher (up to € 90.000 / project) via Deployment Open Call

OVERVIEW OF THE OPEN CALLS:

1st Open Call

for the Assessment Voucher:
28 January - 29 March 2021

2nd Open Call

for the Assessment Voucher:
29 June - 30 September 2022

1st Open Call

for the Deployment Voucher:
30 June - 29 October 2022

2nd Open Call

for the Deployment Voucher:
16 January - 30 April 2023

ASSESSMENT VOUCHER

Assessment Voucher has been one of two financial instruments offered by Change2Twin to manufacturing SMEs to improve their digitalization level, with a view to create and deploy a digital twin. It was a non-refundable grant provided on a competitive basis and amounting up to €10.000 (lump sum).

The Assessment Voucher covered the costs of an in-depth analysis of the company's digitalization level and its readiness for the adoption of a digital twin. The analysis was complemented by 3 recipes for creating and deploying a digital twin according to the needs of the beneficiary. The obtained recipe could be used as a base to apply for the second financial instrument – the Deployment Voucher.

The analysis and the recipes followed Change2Twin methodology and were carried out by certified Digital Innovation Hubs (DIH).

DEPLOYMENT VOUCHER

The Deployment Voucher has been the second funding scheme offered by Change2Twin. Its purpose was to help manufacturing companies to create and deploy their first digital twin. The non-refundable grant per company was up to €90.000.

The Deployment Voucher offered an 11-months support programme for beneficiaries. This included technical mentorship to support the digital twin deployment in each phase of its implementation from user requirements to design specifications. The beneficiaries also got guidance in terms of suitable technologies and standards to be applied in their digital twin. At the end of their experiments beneficiaries provided final reports.

PILOT EXPERIMENTS BEFORE THE OPEN CALLS

In order to prove the concept of its financial instruments, Change2Twin carried out four pilot experiments in 2020-2021 with companies from various manufacturing branches. These experiments illustrated the potential of selected digital twin technologies and provided background and inspiration for other manufacturing companies.

After the successful completion of the four pilot experiments, Change2Twin offered its solution to manufacturing SMEs in the open calls.

LIST OF CHANGE2TWIN PILOT EXPERIMENTS:

- **Aetna Group/Robopac,** Italy: The wrapping machine manufacturer Robopac created a digital twin to model different wrapping strategies to reduce the volume of wrapping material. At the same time Robopac increased the wrapping speed and can now offer new digital services to its customers.

- **Graphenstone,** Spain: The paint manufacturer Graphoenstone created a digital twin of its paint manufacturing process by digitalizing analog processes. Data from inside and outside the factory served as input to set up a real-time inventory, minimize the inventory time and decreased their operational costs.

- **Additive Industries,** the Netherlands: The 3D metal printing machinery manufacturer Additive Industries created a digital twin to keep their machinery certified for the use by heavy demand customers, like aerospace and healthcare.

- **Space Structures,** Germany: The part design bureau Space Structures GmbH showcases a prothesis adapter which will be used to study how digital twins support product development, manufacturing and testing of mechanical parts and systems; in particular how designs perform longer under higher stress using less material by using additive manufacturing.

Click here to watch the presentations of pilot experiments on our YouTube channel

OUR BENEFICIARIES AND THEIR PROJECTS

DEPLOYMENT OPEN CALL 2023

TEKKAN PLASTIK _____ from Turkey
FIELDMADE _____ from Norway
FOCCHI _____ from Italy
INDAERO GRUPO EMERGY _____ from Spain
LABORMAK _____ from Italy
MIRELITE MIRSA _____ from Hungary
SANGALLI _____ from Italy
TRYGONS _____ from Greece
ORION ADDITIVE MANUFACTURING_____ from Germany
CEAMSA _____ from Spain
ISOCHRONIC _____ from Switzerland
STOTEX _____ from Serbia
REMOIN MONTAJES _____ from Spain
RO-RA AVIATION SYSTEMS _____ from Austria
TOTAL PLASTIC SOLUTION _____ from Ireland

Beneficiary testimonial

“After implementing the digital twin solution, our manufacturing processes underwent a remarkable transformation. The insights and predictions generated by the digital twin have significantly improved our product quality and operational efficiency. I am thoroughly excited with the upcoming results and would highly recommend this solution to other companies seeking to optimize their production processes.”

Yeşim Aslan, R&D Lead, Tekkan Plastik, Turkey

Tekkan Plastik
from Turkey

Tekkan Plastik is a Turkish company specializing in plastic injection, part production, and assembly for household appliances and automotive sectors. It has more than 350 employees working in the city of Kocaeli. Their digital twin addresses increase of product quality in plastic injection by providing real-time insights from moulding machines.

Now the digital twin “InjecTwin” provides Tekkan with periodic output and helps them understand production conditions, seasonality changes or differences in the product portfolio. This enables them to stay informed about the status of the production process and helps them to make informed decisions. Tekkan plans to extend the deployment of the digital twin across all injection machines in the factory.

Beneficiary testimonial

“Change2Twin has served as a great experimentation platform for us at Fieldmade to further develop and explore digital twinning of our mobile additive manufacturing systems. In return, we have increased our understanding and confidence in our product portfolio, and we are ready to level up our digital twins in the coming months.”

Brage Vasseljen, Lead Engineer, Fieldmade, Norway

Fieldmade
from Norway

Fieldmade is a Norwegian company from Oslo specializing in deployable additive manufacturing and digital supply chains. They are developing advanced solutions for containerized and deployable additive manufacturing, the NOMAD system, increasing operability and mission readiness across different sectors.

The purpose of their digital twin is to implement a solution that monitors the NOMAD system(s) during transit, deployment, and operation. This gives the company better control of operating conditions during deployment, improved process stability, increased ability to perform predictive maintenance and increased ability to provide remote assistance. Fieldmade can now extract more data from their microfactory. Additionally, the digital twin has increased their confidence in NOMAD systems, by backing up their hypotheses with data. In the future they hope to develop a self-regulating NOMAD system using the outcomes of digital twinning and tested routines.

Beneficiary testimonial

“The digital twin is engaging Focchi personnel in different warehouses operations, showing them the opportunities of digitization and data potential for their daily activities. The digital twin promises to be a game-changer for Focchi, and I am excited about its potential to transform the wider industry in the prefabrication building component in construction sector.”

Alessandro Pracucci, Head of Innovation, Focchi, Italy

Focchi
from Italy

Focchi is an Italian family-owned company specializing in production of high-tech façade solutions - architectural building envelopes. The company’s HQ is located in Rimini. It has more than 350 employees across several locations. Focchi's digital twin is a virtual replica of their warehouse, designed to address inefficiencies and safety concerns in their complex manufacturing process (based on design-to-engineer process).

By integrating IoT and AI with existing ERP data, the digital twin empowers data-driven decision-making, optimizes warehouse management, and enhances worker safety though digitalization of means of transportation such as forklifts and bikes. Once the results are validated, Focchi considers to extend the digital twin's application to other warehouses across the company.

Check our YouTube channel and hear about Focchi!

Beneficiary testimonial

“Implementing a digital twin in our manufacturing it’s being an excellent opportunity to develop and strengthen capabilities of our team in digital transformation. We look forward to continue improving the results and adopting feedback from the mentors.”

Marcela Cumbe, R&D Engineer, Indaero Grupo Emergy, Spain

Indaero Grupo Emergy
from Spain

Indaero Grupo Emergy is a Spanish SME dedicated to advanced engineering and manufacturing for the aerospace sector. They have 42 employees and are located in the region of Andalusia. The purpose of their digital twin was to create a digital model of the vacuum thermoforming process.

Based on machine setting data, thermographic mapping, vacuum monitoring, the solution aims to improve efficiency of resources and machine’s operation. The digital twin is supporting engineers, quality technicians, and machine operators in making more accurate decisions during the forming process. Real-time data makes the thermoforming a living process helping to reduce the rate of discarded parts and material consumption, improving the knowledge and control of thermal processes, material behaviour and system integration.

Beneficiary testimonial

“Labormak's first experience with the digital twin has yielded compelling results. This experience opens the way for future robust testing, allowing for a direct comparison of real system performance with its virtual counterpart. What initially seemed like a futuristic concept unfolded into a practical solution as we progressed.”

Federico Fumagalli, R&D Engineer, Labormak, Italy

Labormak
from Italy

Labormak is an Italian SME from the city of Piacenza specializing in production of robotized cells for the logistics industry. They also design and manufacture industrial prototypes of machinery for various fields of applications. Their digital twin addresses company intralogistics. By providing a virtual replica of complex intralogistics plants, it enhances customer engagement by allowing them to visualize and understand proposed solutions.

This ensures smoother transitions from the pre-sales phase to design activities and commissioning, streamlining the entire process. Moreover, the digital twin enables early-stage testing and validation, accelerating the identification and correction of performance issues offline, thus minimizing the time required for commissioning. Ultimately, by optimizing workflow efficiency, the digital twin initiative aims to enhance customer satisfaction, reduce costs, and drive overall operational excellence.

Beneficiary testimonial

“The development and the implementation of our digital twin has been the first major step towards the state-of-the-art digitization of our operations. We are eager to see that operational improvement and efficiency are already palpable and there is more to come.”

Dr. József Losó, majority owner and president of MIRELITE MIRSA Zrt., Hungary

Mirelite Mirsa
from Hungary

MIRELITE MIRSA Zrt. is a Hungarian company processing almost all types of cultivated vegetables and fruits available in the country, tracking the produce's journey from seed to consumer. The key objective of their digital twin was to provide a real-time simulation of vegetable blanching process to ensure the best product quality, long with optimal energy consumption.

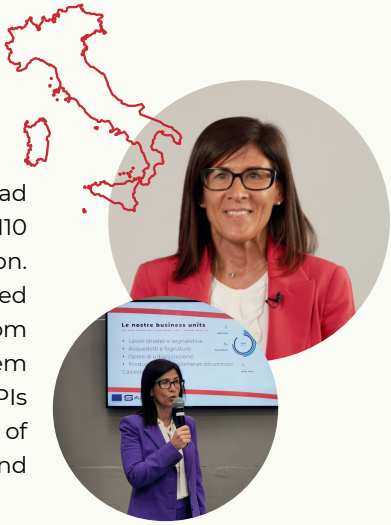
The digital twin is now fully operational and is used in the dynamic synchronizing of the vegetable heating and chilling processes. The solution has boosted resource efficiency, reduced energy and water consumption, optimized costs and waste of food, and ultimately improved food safety and quality for the company. The next step will be to incorporate more operational processes into the digital platform and thus enrich its functionality and elevate its impact.

Check our YouTube channel and hear about Mirelite Mirsa!

Beneficiary testimonial

“It was the first implementation of a digital twin. The project started from an idea that most people in our industry would consider unfeasible; the more the project advanced, the more we realized we were on the right track. These results convinced us that the digital twin solution is not only applicable to our processes but also delivers extraordinary results.”

Raffaella Donghi, Chief Financial Officer, Sangalli SPA, Italy



Sangalli SPA
from Italy

Sangalli SPA is an Italian company specializing in road works and technological infrastructures. They have 110 employees, and they are located in Bergamo region. Their cognitive digital twin consists of advanced modelling and machine learning techniques from data acquired by the equipment. The system improves the analysis of Sangalli’s operational KPIs (resource optimization, cost savings, reduction of downtime) and enables smarter budgeting and planning of subsequent construction sites.

Furthermore, it will improve the real-time control of construction sites, optimization of asphalt production planning, monitoring of construction progress and logistics scheduling. The digital twin uses an AI-based platform for tracking flooring activities, suggesting the right combination of resources for the next construction site and data collection from machines involved in the production process.

Beneficiary testimonial

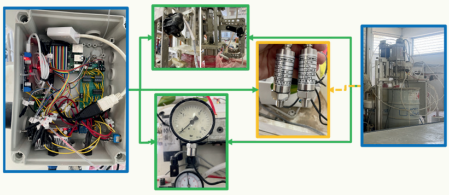
“Implementing our first digital twin was a transformative experience. Digital twins are not just a tool for SMEs and larger industries but a game-changer for any business looking to enhance its operational capabilities and competitive edge. We strongly recommend digital twins to colleagues in other industries.”

Evagoras Zervas, TRYGONS SA, Greece

Trygons
from Greece

TRYGONS SA is a Greek trailblazing manufacturer with a focus on composite parts for the marine and automotive industries. The company has 24 employees.

The purpose of the digital twin created and deployed for the gelcoating process is to achieve a comprehensive, high-fidelity replication and monitoring of this complex manufacturing operation. By integrating sensors and digital technologies, the digital twin accurately tracks and analyzes the details of the gelcoating process, which is crucial for ensuring the quality of the final product. This includes the precise spraying of the correct quantity of gelcoat onto the mold. Looking ahead, TRYGONS plans to enhance its digital twin by adding an AI component. This addition is anticipated to revolutionize the predictive maintenance capabilities of the existing digital twin.



Check our YouTube channel and hear about Trygons’ digital twin!

Beneficiary testimonial

“We expected that the digital twin would underscore our existing process knowledge and provide concrete proof of what we already knew. This, was confired. What we did not expect was that it went beyond that, and we are now able to detect anomalies in our process much earlier as well as detect ones that would otherwise might not be found!”

Marien Wolthuis, Lead Engineer, Orion Additive Manufacturing, Germany

Orion Additive Manufacturing
from Germany

Orion Additive Manufacturing GmbH is a young company with a small team. From their labs in Berlin, Germany, they provide additive manufacturing solutions for high-performance polymers through their advanced 3D printing systems and services.

Their digital twin mirrors the printed object to allow for a non-destructive inspection of internal part quality during and after manufacture. The envisioned manufacturing process that includes the digital twin will differ from the standard additive manufacturing production process because the digital twin is used to validate the results of this process. The digital twin can be used to prove that parts are internally identical, ensuring repeatability, and increasing trust in the finished components while simultaneously lowering the waste created by destructive inspections.

Beneficiary testimonial

“This project has shown us the importance of digital twins within our industry 4.0 strategic plan as a transversal technology to improve the efficiency and sustainability of the company.”

CEAMSA

CEAMSA
from Spain

Compañía Española de Algas Marinas S.A. (CEAMSA) is a Spanish company from O Porriño in Galicia. The company specializes in production, development and worldwide distribution of natural hydrocolloids such as carrageenan, pectin, fibre, alginate and refined locust bean gum.

These products are demanded in food industry, cosmetics and pharma industry due to their stabilizing, gel forming, thickening and texturizing properties. The digital twin allows CEAMSA to carry out simulations with which they can optimize and predict the behavior of the raw material in the process, improving efficiency, quality and energy consumption. Their idea is to apply such simulations also in other production lines to improve the general sustainability of the production plant.

Beneficiary testimonial

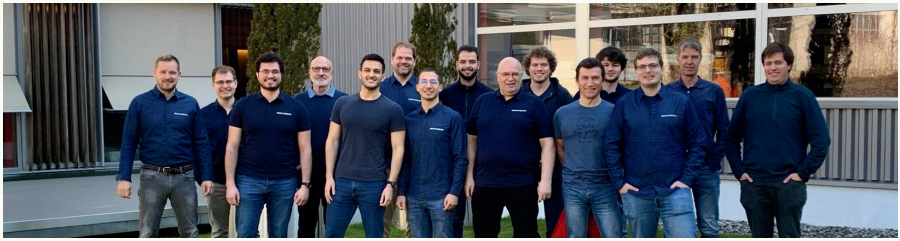
“The Change2Twin project helped our young industrial company develop an initial digital twin implementation and first results look very promising. We are convinced that many robotics companies can benefit from the support of this program and we highly recommend it.”

Dr. Melvin Haas, Isochronic AG, Switzerland

Isochronic
from Switzerland

Isochronic AG is a young Swiss SME, which develops new robotic systems incorporating the proprietary robotics control software and advanced pick & place algorithms. The company is located in the city of Denges and has 13 employees.

The purpose of their digital twin is to accelerate the sales cycle by allowing a fast digital configuration of every new robot system setup. This should provide customers with a working 3D digital version of their configured robotic system which can demonstrate the manipulation of their own parts. Moreover, the digital twin allows the company to maximize the throughput of parts which can be sorted by Isochronic's robotic system thanks to optimized sorting algorithms and associated robot motion control strategies.



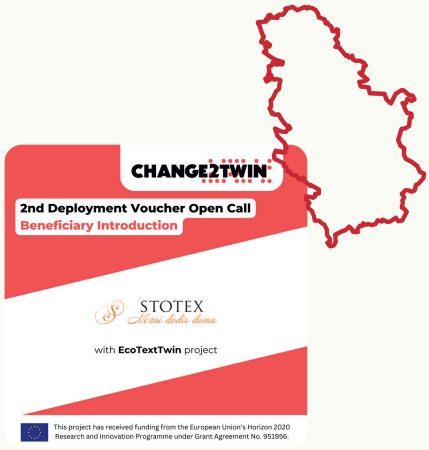
Beneficiary testimonial

“It was the first digital twin implementation for our company and the results are very positive. Especially important is the possibility to understand the impact of particular process modes on the energy consumption as well as environmental aspects.”

Stotex

Stotex
from Serbia

Stotex doo is a Serbian producer of home and hotel textiles. The purpose of their digital twin is to achieve eco-friendly production in through retrofitting existing textile processing machines using AI and digital twins, which allows to monitor the dynamics of production system and predict its behaviour in digital environment.



It includes both opportunities for self-adjusting process optimization and AI-based retrofitting which plays a strategic role to preserve the company competitiveness and sustainability.

Beneficiary testimonial

“With the innovative approach of the digital twin of the cleaning and quality control of bottles, we will position ourselves as the sole company in our sector and geographic area that can fulfill the needs of the SMEs of the beverage sector in terms of quality and food safety, without investing high amounts of money. We are already planning to expand and adapt the concept to the control quality of other machines.”

Olaya Munoz, technology consultant, UpIntelligence, Spain

Remoin Montajes
from Spain

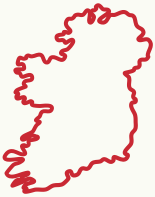
Remoin Montajes S.L., is a Spanish SME specializing in designing and constructing machinery, for the food and beverage sector. The company is located in the region of Asturias and has 37 employees. The purpose of their digital twin is to automate the quality control of recycled cider bottles to prevent contamination through dirt. Thanks to the implementation of a sophisticated dirt detection system based on artificial vision, better results are obtained by eliminating human error.

An additional objective of the company is to design and implement a comprehensive system that includes a 3D simulation, the previously mentioned dirt detection software, and real-time control and visualization software for results and alarms.

RO-RA Aviation Systems
from Austria

RO-RA Aviation Systems intended to develop a digital twin for the tube production process to ensure reproducibility and hence create the prerequisite for optimizing the pre-industrialization phase. However, this experiment had to be suspended due to the acquisition of the midcap by a large enterprise, and thus becoming not eligible for Change2Twin funding.

Total Plastic Solution
from Ireland



The Digital Twin is aimed to support Preventative Maintenance of Injection Mounding machines with a focus on the heating elements and the wear of the injection parts while also providing data on the actual energy costs and the CO2 costs of production.

The Digital Twin will monitor data from machines to determine trends in energy use by the machine functions, energy monitoring together with digital signals will aid the digital twin in identifying which elements are using power.

DEPLOYMENT OPEN CALL 2021

DNA PHONE _____ from Italy

SALVAGNINI MASCHINENBAU _____ from Austria

MAROVT _____ from Slovenia

PRESSIOUS ARVANTIDIS _____ from Greece

NEUTROPLAST _____ from Portugal

CROOM PRECISION TOOLING _____ from Ireland

JUNTAS INDUSTRIALES Y NAVALES _____ from Spain

LEGUMBRES LA TIERRINA VAQUEIRA _____ from Spain

MARINA TEXTIL _____ from Spain

PLANETA TECHNOLOGY _____ from Serbia

DNAPhone Srl from Italy

DNAPhone is an innovative Italian company that develops diagnostic systems for quality controls in the Food&Beverage sectors. Smart Analysis is the main product dedicated to small and medium-sized wineries and breweries who want to improve their quality control in a simple way, without the need for specialised personnel or dedicated laboratories.

The main purpose of the digital twin in DNAPhone's project was the optimization and best quality of the product and of the production line, optimising the operational and managerial part. The project included simulation of the behaviour of devices to characterise them and choose the best optical or electronic one to improve product performance.

Check our YouTube channel and hear about DNAPhone experience with Change2Twin project: Video interview | Video from the plant

Salvagnini Maschinenbau GmbH from Austria

Salvagnini Maschinenbau GmbH an engineering company specialised in the development and production of sheet metal bending machines. Situated in Ennsdorf/Austria, Salvagnini has 447 employees, around half of them involved in the production of bending machines.
Salvagnini developed a digital twin for predictive maintenance to increase machine availability in the field, support service technicians and consult R&D engineers and management. Successful implementation of this digital twin further strengthened the most relevant business KPIs of Salvagnini: total cost of ownership (TCO) at customer, customer satisfaction and service portfolio diversity.

Video interview with Thomas Gross | *Video from the plant*

Marovt d.o.o. from Slovenia

Marovt d.o.o, is a family-owned company with over 220 employees and with one of the most advanced forging productions in Europe. The main activity of our company is the high-quality forging, machining of forged parts and the production of turning parts for the most prestigious leading trademarks in the automotive industry.

The company aimed to improve their scheduling process by introducing a digital twin for the production process in their turning facility Loče. The ultimate goal was to fully digitise the company and improve the scheduling process which was often affected by unplanned events and repetitive redoing of schedules.

Video interview with Žan Štern

Check our YouTube channel Digital Twin Champions and hear about their experience with Change2Twin project

Beneficiary testimonial

It was the first digital twin implementation for our company and the results were very, very interesting. So I have already recommended other colleagues, in other SMEs, to try their own digital twin.

Chris Trochoutsos, *Pressious Arvanitidis*, Greece

Pressious Arvanitidis S.A.

from Greece

Pressious Arvanitidis is the largest graphic design and offset printing company in Greece, maintaining a list of over 800 businesses as active clients across Europe and is awarded for innovative printing products and designs (Environmental Awards 2013, Packaging Innovation Awards 2017).

Its printing factory is located close to Athens and currently executes more than 10,000 printing orders per year. Currently, it has 100 employees in 12 different departments.

Pressious adopted the digital twin technology to optimise production and minimise environmental footprint. They mapped all processes to digital ones, which allowed them to run them in a safe environment with minimal cost. This project allowed them to optimise orders and production by configuring the machines through the digital twin.

Check our YouTube channel and hear about Pressious Arvanitidis experience with Change2Twin project: Video interview with Chris Trochoutsos | Video from the plant

Beneficiary testimonial

This pilot was an amazing experience and we are glad that. we could translate all the work and results to the jury in a way that was possible to evaluate.

Tânia Simões, *Neutroplast*, Portugal

Neutroplast - Indústria de embalagens Plásticas S.A.
from Portugal

Neutroplast is an SME that offers primary packaging and medical devices within the pharmaceutical, cosmetic and healthcare sectors. With a consolidated experience of 28 years, there is a constant pursuit of innovation and new techniques that guarantee the improvement of solutions for packaging.

The project aimed to create a digital twin application for an industrial process to enhance overall performance. The digital twin application served as a foundation for disseminating the solution to all processes and technologies at Neutroplast, increasing expertise in core competences and moving towards the goal of zero-defects.

Check our YouTube channel and hear about Neutroplast experience with Change2Twin project: Video interview with João Redol

Croom Precision Tooling from Ireland

Croom Precision Tooling operates a vertically Integrated Management System (IMS) accredited to ISO 13485 and ISO 14001. In working with over 72% of our customer base for over 20 years, we continue to build long lasting partnerships with the medical industries leading companies in providing high quality Class I, II & III Orthopaedic Implants and Instruments at a competitive cost.

The company aimed to improve their manufacturing process through digitalisation by focusing on optimisation, best quality and preventative maintenance. The experiment was focused on developing a digital twin application for the HAAS Multigrind processing femoral knee castings.

Video interview with Shane Keaveney

Juntas Industriales y Navales S.L. from Spain

Juntas Industriales y Navales is a company specialised in the manufacturing of tailor-made sealing gaskets from a wide range of materials that are applied to different industries, such as energy, oil & gas, steel, maritime, concrete, chemical & pharmaceutical, water treatment.

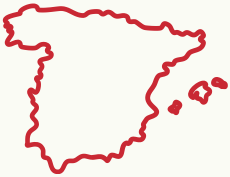
The digital twin will serve for the predictive maintenance of the machines used for cutting and pressing, for the manufacturing of gaskets. The system monitors several variables that are relevant for the shelf life and functioning of machines and give alerts when a parameter is out of the established range, or a machine is reaching the end of its shelf life and can cause important losses or problems to the company.

Video from the plant

Check our YouTube channel and hear about their experience with Change2Twin project

Legumbres la Tierrina Vaqueira S.L.U. from Spain

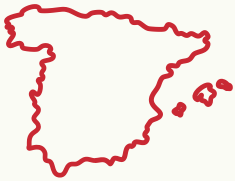
Company funded in 2005, dedicated to the cultivation, manufacturing and packaging of fresh and dry beans belonging to the Protected Geographical Indication "Faba de Asturias" and other legumes, some of them with ecological label (agrifood sector).



The digital twin is used for the monitoring of the process of the fresh beans pods that the company harvested: the entrance and the passage to the warehouse, including the environmental conditions of the storage.The company also developed a web application which is able to predict the amount of material that will be entering the storage using historical data. The system includes a traceability module to register the batches and all the stages and incidences associated with them, and also a dashboard for visualisation.

Check our YouTube channel and hear about Legumbres la Tierra Vaqueira experience with Change2Twin project: Video from the plant

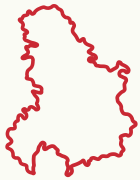
Marina Textil, S.L.
from Spain



Marina Textil is a Spanish company, founded in 1995 with a production plant near Barcelona, whose activity is focused on the manufacturing and commercialization of technical protective fabrics (woven fabrics, knitted fabrics) to produce personal protective equipment (PPEs) for a wide range of industrial sectors (chemical, foundries, electrical petrochemical, clean rooms, automotive, electronics, etc.), but also for the services sector (firefighters, police).

The company was already collecting real-time insights from its production plant. In this experiment they further developed their Extranet to optimise the purchase process and offer new features to the clients. This includes a dynamic interface in which clients can consult the foreseen delivery times of their recurring items in real time. The digital twin should reduce production costs and order lead-times and optimise delivering times which at the end lead to increased customer satisfaction.

PLANETA Technology D.O.O.
from Serbia



The company Planeta Technology was established in 2007. The company designs and manufactures furniture and furnishes residential and commercial interiors.

The digital twin system developed for Planeta Technology allows to monitor the dynamics of the production system and predict its behaviour in the digital environment. The system consists of two main elements: 1) the collection of production data, energy, emission and waste related data and 2) complex modelling of their relations to understand when small deviations in process data will indicate “big” problems in the environment-related quality aspects. The goal was to enable proactive detection of problems and avoiding that environment-related effects will escalate.

ASSESSMENT OPEN CALL 2020

Carpatis SRL from Romania
CARPATIS is a company located in Suceava, in the North-Eastern part of Romania, focused on manufacturing meat products and retail trade. Assessment done by DIH Digital Innovation Zone.

DNAPhone Srl from Italy
DNAPhone develops diagnostic systems for quality controls in the Food & Beverage sectors. DNA Phone applied and succeeded in the subsequent Deployment Open Call. Assessment done by DIH SMILE.

Jasil - J. ANTONIO DA SILVA, LDA from Portugal
JASIL - J. ANTONIO DA SILVA, LDA is a metalworking company whose principal activity is the manufacture of parts and accessories for motorcycles and scooters. Assessment done by DIH PRODUTECH.

Marina Racewear, S.L. from Spain
Marina Racewear is a company producing racewear. Assessment done by DIH PRODUTECH.

E.CIMA, S.A.U. from Spain
E.Cima produces high-quality synthetic fabrics for diverse markets (e.g. footwear, automotive, cycling). Assessment done by DIH PRODUTECH.

ELVEZ d.o.o. from Slovenia
Elvez is an advanced manufacturing company specialised in providing clients worldwide with plastic injection components, metallised parts and cable harness solutions. Assessment done by DIH Pomurje.

Evers Agro BV from the Netherlands
Evers AGRO develops, produces and sells agricultural machines for tillage, grassland care and fertilisation of arable land. Assessment done by DIH SWF.

Industrie Saleri Italo S.p.A. from Italy
Industrie Saleri Italo is a leading company in the design, development and production of water pumps and cooling systems for the automotive industry. Assessment done by DIH Bi-Rex.

Neutroplast Indústria de embalagens Plásticas S.A. from Portugal
Neutroplast is an SME that offers primary packaging and medical devices within the pharmaceutical, cosmetic and healthcare sectors. Neutroplast applied and succeeded in the subsequent Deployment Open Call. Assessment done by DIH PRODUTECH.

Marovt d.o.o. from Slovenia
Marovt is a company whose main focus is on forging, machining of forged parts and the production of turning parts for the most prestige leading trademarks in the automotive industry. Marovt applied and succeeded in the subsequent Deployment Open Call. Assessment done by DIH Slovenia.

Metalmecánicas HERJIMAR SL from Spain
Metalmecánicas HERJIMAR focuses on construction, repair, assembly and maintenance advanced activities for the overall industry; naval, railway and transport sectors, becoming now a competitive manufacturing services company. Assessment done by DIH I4MSOUTH.

MobyFly SA from Switzerland
MobyFly is a Swiss-based start-up from the shipbuilding sector. Assessment done by DIH PRODUTECH.

SIA Jelgavas Tipografija from Latvia
SIA Jelgavas Tipografija is a printing house specializing in printing of high quality books, diaries, advertisements and similar products. Assessment done by RTU ITI DIH.

SafeSteel SRL from Romania

SafeSteel is a company located in Suceava, in the North-Eastern part of Romania, focused on manufacturing metal constructions and component parts of metal. Additionally, SafeSteel's activity relies on civil constructions and furniture manufacturing. Assessment done by DIH Digital Innovation Zone.

Salvagnini Maschinenbau GmbH from Austria

Salvagnini Maschinenbau GmbH an engineering company specialized in the development and production of sheet metal bending machines. Salvagnin applied and succeeded in the subsequent Deployment Open Call. Assessment done by DIH Linz Centre of Mechatronics.

Nordarin Prod Com SRL from Romania

Nordarin produces solid wood furniture. Assessment done by DIH Digital Innovation Zone.

Simem SPA from Italy

SIMEM specializes in designing and manufacturing machinery and plants for the construction industry. Assessment done by DIH SpeedHub.

Takumi Precision Engineering from Ireland

Takumi Precision is a precision component manufacturing partner with the ability to develop products from concept, through prototyping and onto the full production run. Assessment done by DIH IS4PROD.

Total Precision Limited from Ireland

Total Precision is an engineering company who specialise in precision machined component & finishes. Assessment done by DIH IS4PROD.

ASSESSMENT OPEN CALL 2021

Bizzcom s.r.o. from Slovakia

Bizzcom is an SME operating in the process automation industry, specializing in the area of production of automated mechatronic machinery and devices development & manufacturing. Assessment done by DIH Slovak Centre of Digital Innovations.

Compañía Española de Algas Marinas (CEAMSA) S.A. from Spain

CEAMSA is a leading producer of carrageenan, a natural jellifying agent extracted from red seaweed. Assessment done by Ágora DIH Región de Murcia.

Comércio Design Industrial from Portugal

Comércio Design Industrial is a leading Additive Manufacturing company in Portugal. Assessment done by DIH iMan Norte Hub.

GIG Karasek GmbH from Austria

GIG Karasek engineers, manufactures, and distributes high-quality products for thermal separation in industrial process plants. Assessment done by DIH Linz Centre of Mechatronics.

Cotonificio Albini Spa from Italy

Cotonificio Albini Spa Cotonificio Albini is a fabrics manufacturer and handles the dyeing, weaving, production of samples and inspection of the fabrics. Assessment done by DIH Big Data Innovation & Research Excellence.

DB Biotech, a.s. from Slovakia

DB Biotech is a producer of antibodies mainly used for clinical diagnostics of cancer in early stages and for research purposes. Assessment done by DIH Slovak Centre of Digital Innovations.

Beneficiary testimonial

We would like to express our appreciation to the consortium for the opportunity and the lessons learned from this experience. We will take the feedback into consideration as we continue to refine our future proposals and explore other avenues to contribute to the digital twin ecosystem.

Stanislav Hreško PhD, DB Biotech, Slovakia

Glasscom S.L. from Spain

Glasscom manufactures fiberglass fabrics with its multiple applications, such as nautical, the wind sector, construction, refrigerated trucks, furniture, among many others. Assessment done by DIH iMan Norte Hub.

Laboratorio Geométrico SL (WINKLE) from Spain

Laboratorio Geométrico specializes in the manufacture of biodegradable 3D filaments, with a wide variety of materials and chromatic ranges. Assessment done by DIH Industry 4.0.

Italbox industrie riunite SpA from Italy

Italbox specializes in design and molding of elements and components in Expanded Polypropylene, Expanded Polyethylene, Expanded Polystyrene. Assessment done by Digital Innovation Hub Piemonte.

RO-RA Aviation Systems GmbH from Austria

RO-RA Aviation Systems GmbH is an aviation technology company that develops and manufactures custom solutions for their customers. Assessment done by DIH Linz Centre of Mechatronics.

Tekkan Plastik ve Ticaret AŞ from Turkey

Tekkan is a plastic parts producer for automotive and white goods. Assessment done by Intelligent Factory and Robotics Laboratory Digital Innovation Hub.

The SARM Project from Greece

The SARM Project is an engineering company focused on developing new concepts for high-efficiency compressors, expanders, pumps, and internal combustion engines. Assessment done by North- East Romania DIH.

Total Plastic Solution Ltd from Ireland

Total Plastic Solution is a custom plastic injection moulding company. Assessment done by DIH IS4PROD.

Altechna R&D UAB from Lithuania

Altechna is a company developing laser micromachining solutions. Assessment done by Sunrise Valley Digital Innovation Hub.

COOPERATION WITH DIGITAL INNOVATION HUBS

Digital Innovation Hubs (DIH) are very important partners for Change2Twin. They act as brokers for local SMEs which seek to get **digital twin maturity assessment** (Assessment Voucher) by Change2Twin. DIHs carry out the assessment of the company's potential for digital twinning, create their individual twinning recipe using the Change2Twin Marketplace and thus help them on their way to get a digital twin.

Change2Twin organised **two calls for expression of interest for DIHs** to become part of the programme. The representatives of the DIHs were trained in Change2Twin assessment methodology which made them eligible for providing the service (digital twin maturity assessments to SMEs). Through the certification process, DIHs benefit from high level knowledge and expertise on digital twin : common understanding, enabling technologies, main barriers, standards, etc

The **network of cooperating DIHs grew to 54** from 21 EU or associated countries. Many of them then actively participated in both assessment open calls by carrying out assessments for selected SMEs.

SUSTAINABILITY

The main objective is to ensure that every manufacturing SMEs have easy access to technologies needed to deploy a digital twin even after Change2Twin ends therefore we created a **strong network** composed of DIHs that get certified for delivering assessment to manufacturing SMEs, DIHS and EDIHs that are interested in supporting SMEs and mid-caps toward digital twin. Thus, we engage our network through different channels, events and workshops to disseminate best practices, success stories and funding opportunities on digital twinning.

Our goal is to create a sustainable business model so that the certified DIH can still provide services also beyond the scope of Change2Twin project and that other DIH/EDIH use **the tools** that have been developed and the Change2Twin **marketplace.**

Change2Twin project developed two assessment tools: the **Compass tool** focused on the digitalization assessment and the **7-steps-tool** focused on the digital twining readiness assessment with a 7 steps roadmap to successful digital twin implementation. Combined with the marketplace, they should help to identify appropriate digital twin solutions for manufacturing SMEs.

The marketplace is a key element of sustainability, gathering internal Change2Twin partners' technology offerings but also offerings from external technology providers.

LESSONS LEARNED

The mentorship experience proved to be successful in achieving the desired outcomes of the selected experiments. The deployment voucher proposals were generally characterized by clarity and unambiguous nature, resulting in tangible results. However, valuable lessons were learned throughout the process.

One significant challenge emerged with changes in **project ownership** within the companies, causing disruptions in knowledge transfer and project continuity. To address this, a more explicit process should be established to ensure alignment between outgoing and incoming personnel, facilitated by regular calls involving the mentor.

Another hurdle involved **language barriers** and varying interpretations of technical terms, especially among non-native English speakers. To mitigate this, a shared glossary could be introduced to standardize communication. The potential for missed deadlines was acknowledged, prompting the reinforcement of existing protocols for reporting delays to the mentor. Establishing effective communication channels, such as TEAMS chat, alongside regular meetings, become imperative for addressing issues promptly.

Reflecting on the overall experience, the mentorship underscored the **keys to success:** a precise and comprehensive proposal, the adaptability of complementary strategies, clear definition of the digital twin model and scope, robust data preparation for data-driven approaches, alignment between DIH and SMEs, a well-structured Implementation Master Plan, measurable KPIs, risk identification and mitigation, mentor-SME alignment, periodic progress updates, and the mentor's technical expertise and support. Through these insights, the mentorship journey contributed not only to successful experimentation but also to refining the approach for future collaborations.

Reflecting on the overall experience, we identified **key aspects for a successful Deployment Voucher experiment** that are a combination of well-defined strategies, clear communication, and diligent risk management. The following key principles play a pivotal role in achieving your goals:

1. **Clear and Concrete Proposals:** begin with a well-structured and unambiguous project proposal that outlines specific objectives, expected outcomes, and measurable targets. This not only sets the stage for alignment but also enables effective monitoring of progress.

2. **Complementary and Incremental Approaches:** recognize the potential for various recipes or strategies to complement one another, leading to an incremental growth in outcomes. This approach encourages adaptability while fostering innovation.

3. **Define the Digital Twin Model and Scope:** precisely identify the digital twin model to work with and the scope of the project to prevent scope creep and helping manage expectations.

4. **Data-Driven Approach Preparation**: if pursuing a data-driven approach, having access to historical data before the project's commencement is a must. Alternatively, a reliable process to gather necessary data should be established. This forms the foundation for accurate analysis and decision-making.

5. **Alignment between DIH and SMEs**: harmonizing the goals and expectations between the DIH and the company to ensure everyone is working towards the same objectives and minimizes potential conflicts.

6. **Measurable KPIs**: Identifying Key Performance Indicators (KPIs) that are quantifiable and directly related to the project's success help enabling objective assessment and ongoing improvement.

7. **Thoughtful Individual Mentoring Plan (IMP)**: devise a reasonable IMP that considers factors such as project execution methodology (e.g., waterfall or agile), project management structure, and the inclusion of redundancy measures. Also, ensure that the mentor, an experienced guide, is an integral part of the plan.

8. **Risk Identification and Mitigation**: Anticipate potential risks and develop a robust mitigation plan results in being proactive in addressing challenges to prevent issues that can derailing projects' progress.

9. **Mentor-SME Alignment**: As the mentor's expertise and guidance are pivotal, that the mentor's goals and expectations should align with the project's objectives to foster a collaborative and productive relationship.

10. **Ongoing Communication and Adaptation**: Holding regular meetings to update stakeholders on progress and address potential issues allows for timely adjustments to the plan as needed.

11. **Technical Expertise and Support**: The mentor should possess technical knowledge but also has direct access to a pool of qualified experts who can provide support. This ensures that technical challenges are addressed effectively.

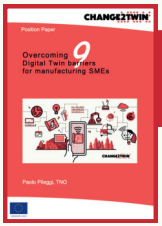
In summary, the keys to success in project execution involve clear communication, alignment of goals, strategic planning, risk management, and technical expertise. Adhering to these principles, enhances the likelihood that the Deployment Vouchers will achieve the desired outcomes while ensuring a smooth journey towards success.

USEFUL RESOURCES

Benefit from our experience to build a digital twin for your company:

Position papers:

ENABLING TECHNOLOGIES FOR DIGITAL TWINS IN MANUFACTURING



OVERCOMING 9 DIGITAL TWIN BARRIERS FOR MANUFACTURING SMES

Success stories of our beneficiaries:

YOUTUBE PLAYLIST: DIGITAL TWIN CHAMPIONS

YOUTUBE PLAYLIST: PILOT EXPERIMENTS

Do you want to know more about Change2Twin success stories?

Scan the QR code and view the presentations of our beneficiaries on Change2Twin YouTube channel!

- Go to www.change2twin.eu
- Join the online community: https://bit.ly/3vLX2CO
- LinkedIn: @Change2Twin

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