

# Dynamic Modelling of Production Supply Chains of SMEs with Large OEMs in DIGICOR

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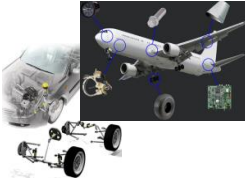
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## Introduction

The supply chain systems of large manufacturers are complex and participating in them is often onerous for small and medium enterprises (SMEs). Our research aims to alleviate this problem and create a new approach for collaborative setup and management of dynamic supply chain networks based on Industry 4.0 solutions, which will be exemplified in a platform developed within the DIGICOR European Union (EU) funded project [1].



## Methodology

The creation of DIGICOR requires an extensive analysis of SME requirements, and the challenge is to design an effective solution that satisfies the needs of all the stakeholders involved, whilst at the same time covering all aspects of supply chain formation in a manner aligned to the Industry 4.0 vision. For this, our research considers the opinions and requirements of OEMs and SMEs within the automotive and aerospace Industry to support the initial stages of the platform development, integrating technologies such as M2M, Internet of Things (IoT), and big data, and even connecting shop-floor data in real time to our specialised tools for partner profiling and search.

## Discussion

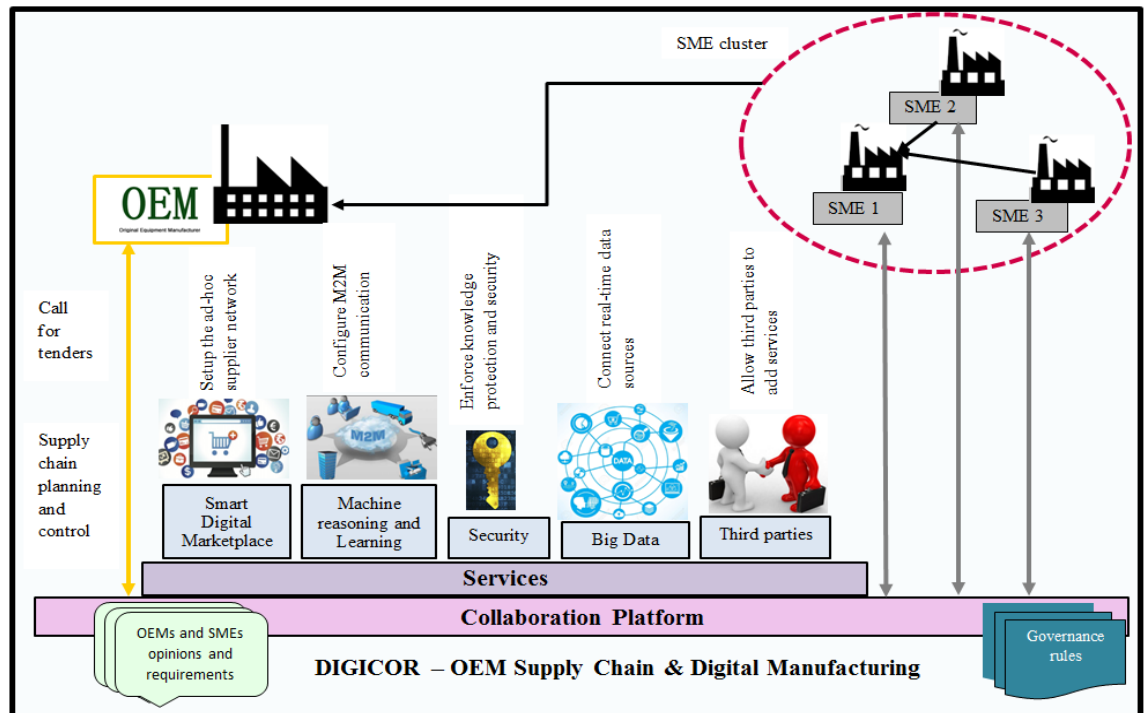
We expect our approach and platform is illustrated in below figure to have a significant impact, facilitating the participation of SMEs in the future of digital manufacturing. Our extensive analysis of existing platforms and technologies in this area has revealed that current systems do not have effective mechanisms for supporting SMEs in forming partnerships [3], and instead rely on vertically integrated Industry 4.0 adoption models to deliver some level of agility and product personalisation. DIGICOR will address these gaps and support collaborations from the setup to the termination, integrating technological means to aid the whole production supply chain towards advancing on the fourth industrial revolution vision in an open and flexible manner.

## Industry 4.0 challenges

The complexity involved in integrating SME services and systems with the platforms of Original Equipment Manufacturers (OEM), and the SMEs capacities being unable to fulfil OEMs requirements on their own motivate the development of DIGICOR to support the provision of new businesses opportunities available to SMEs through collaboration. Industry 4.0 challenges cover scientific and technological contexts, as well as social and economic ones [2]. DIGICOR tackles some of the implicated challenges covering the development of smart devices, the integration of heterogeneous systems and its coordination, and the usage of big data towards augmenting the digitization of manufacturing. All these accompanied by supported business and organizational models, policies and governance rules, to underpin the supply chain collaboration for SMEs and OEMs.

## Aims and objectives

- develop a new approach and platform for collaborative setup and management of dynamic supply chain networks.
- integrate the services and systems provided by SMEs in the dynamic supply chain of OEMs.
- coordinate the contributions of multiple parties and provide the team formed with resilience and adaptive capabilities able to cope with the dynamic environment.
- enforce case-specific governance rules, and procedures for knowledge protection and security, supported by Industry 4.0 solutions.



## Services

- **Smart Digital Marketplace:** A semantic guided marketplace matchmaking engine facilitating the formation of SMEs clusters.
- **Machine reasoning and learning:** To support machine-to-machine (M2M) communication.
- **Security:** Sensitive data must be protected from internal and external threats, and incorrect disclosure.
- **Big Data:** Real time data flows will support the operations of Industry 4.0 tools (e.g. real time scheduling and coordination based on SMEs production capabilities).
- **Security:** employ ISO standards, specifically MPEG suite on data communicated across different organisations within supply network.
- **Third parties:** To facilitate adaptation to changing requirements, the platform allow third parties to add tools and services.
- **Collaboration and governance:** collaboration and governance rules are implemented for knowledge protection.

## Acknowledgments:

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## References:

- [1] Decentralised Agile Coordination Across Supply Chains (DIGICOR), [www.digicor-project.eu](http://www.digicor-project.eu).
- [2] Keliang Z., Taigang L., Lifeng Z., 2015 Industry 4.0: Towards future industrial opportunities and challenges, 12th International Conference on Fuzzy Systems and Knowledge Discovery (FSKD), 2147-2152, IEEE.
- [3] Cisneros-Cabrera, S., Ramzan, A., Sampaio, P. and Mehandjiev, N. 2017 18th Working Conference on Virtual Enterprises: Proceedings of 18th Working Conference on Virtual enterprises. Springer, LNCS Service Science Series, 10 p.