Key Findings from Artemis White Paper: "From the Internet of Things to System of Systems"

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From the Internet of Things to System of Systems ARTEMIS An Artemis-IA study

IoT and SoS play a fundamental role for the European Digital Age:

- IoT is considered the backbone of digitalization
- With a potential market exceeding 3 Trillion € and 30 Billion of connected devices in 3-5 years
- IoT is a solution to improve aggregate efficiency: "Economic growth: demographic growth * aggregate efficiency" (Advancy)
- To accelerate economical recovery after COVID and exploit new opportunities

IoT is one of the six focus areas for Artemis-IA and cover a large part of the ECS value chain

The study provides a snapshot of the IoT market, identifies the achievements and position of Artemis and ECSEL

• 107 Artemis and ECSEL projects considered, 2009-2020

IoT market enablers

IoT market struggled to take-off for a long time but it is entering in a golden era, thanks to some key enablers:

- 1. Decrease of electronic components costs.
- 2. Increase in computing power.
- 3. Global hyper-connectivity.
- 4. Connectivity costs reduction.
- 5. "Everything" as a service.
- 6. Availability of a full value chain.
- 7. New business models supporting digitalization.
- 8. European programs.



The IoT global market A 2020 snapshot towards 2025



ARTEMIS Industry Association



IoT trends What will shape the IoT evolution?



"Everything" digital is accelerating, especially due to the pandemics.

IoT evolution driving factors:

- Computing on the edge and on the far edge
- Edge AI, one of the faster growing trends in the AI domain.
- Hyper-connectivity is a critical factor for IoT. 5G is in the spotlight.
- In IoT we must trust: trustworthiness is crucial and must be perceived more as an opportunity, than a burden.
- New awareness for **sustainability** and Green Deal.
- The nature of IoT/SoS is forcing to reconsider and extend the concept of lifecycle.

All these factors influence and depend deeply on each other.

IoT research streams





Research project

IoT-related project lines





IoT enabling technologies 📕 IoT/SoS architectures 📕 IoT/SoS platforms 📕 Engineering support 📕 Interoperability 📕 Trust

The IoT the value chain Coverage examples...





Investments analysis



In the last 10 years, 2/3 of the total investments* in ARTEMIS/ECSEL has been devoted to IoT-related projects and 1/3 of the total investments* to IoT-specific technologies.

	Tot. 2009-2020	Artemis (2009-2016)	ECSEL (2014-2020)
Total investments for all the calls 2008-2017*	2082 M€	1062 M€	1020 M€
Total investments for IoT/SoS related projects	1524 M€	779 M€	745 M€
Estimated investments only for IoT/SoS topics	716 M€	359 M€	357 M€

*This is an underestimation because, for coherence with ARTEMIS calls, the investments of the ECSEL projects related to semiconductor process technologies, equipment, materials and manufacturing have been excluded from the total, and they have an indirect impact on IoT.

Conclusions



IoT is no more in a hype, it is consolidating.

But some major challenges must be tackled to meet societal needs and the market demand:

- Fill the lack of trust in IoT.
- Ensure an adequate level of interoperability and reduce fragmentation.
- Develop open IoT/SoS platforms that are more ubiquitous, pervasive, autonomous, light and sustainable.
- Provide engineering support for the entire lifecycle of IoT solutions.
- Define a pan European strategy to bundle forces and develop a solid European IoT ecosystem, to support innovation and market development.

References

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Thanks for the attention