Specific challenge:

Today’s manufacturing is increasingly challenged by uncertainties of continuously and rapidly-changing market conditions and increasingly shorter time-to-market requirements. Manufacturing value chains are distributed and dependent on complex information and material flow requiring new approaches inside and outside the factory both on process and product lifecycle level. They have to respond faster and more efficiently to higher complexity and frequently changing designs. Actions must include validation/demonstration elements and involve stakeholders covering the whole value chain.

Scope: a. R&I Actions: proposals are expected to cover at least one of the three themes identified below. CPS-based process optimisation (Cyber-Physical Systems) for adaptive and smart manufacturing systems bringing together novel concepts for CPS, progress in advanced control and simulation technologies. The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

- Methods for integrative control and robust optimization of discrete and continuous processes supporting engineers in their aim of detecting, measuring and monitoring the variables, events and situations which affect the performance, energy-use and reliability of manufacturing systems. Research should encompass progress in smart sensor technologies, smart system design, embedded systems, cognitive technologies and advanced control.

- Scalable CPS architectures for adaptive and smart manufacturing systems to dynamically enable the continuous design, configuration, monitoring and maintenance of operational capability, quality, and efficiency. Self-learning closing the feedback loop between production and design should be included as appropriate. Collaborative and mobile manufacturing: Development of agile collaboration tools for process optimisation of manufacturing assets across the supply chain towards the Cloud-enabled Manufacturing Business Web. Research should address scalable real-time architectures to master complexity and data security of the supply network and underlying logistics resources. In an integrated approach focusing on end-to-end integration of the entire manufacturing processes and the supply networks, research issues to be addressed include: IoT-based continuous data collection from real-world resources, resource virtualisation, real-time, modular architectures for interoperability of intra plant and extra plant processes in conjunction with mobile, collaborative tools for data sharing, data analytics and knowledge-based systems, at factory and at supply network level. The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Towards zero-failure laser-based manufacturing: Fast and accurate process monitoring systems allowing feedback control of laser process parameters in highly dynamic manufacturing processes. Actions should cover in particular the development of (in-line) process monitoring sensors, measurement and non-destructive testing tools including the related high speed data processing and reduction. The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b. Support Actions: Consensus building for a factory-wide interoperability framework for CPS engineering and manufacturing environments; concept and roadmap building in relation to smart and safe workspaces for laser-based manufacturing.** Expected impact:** • Increased capability for better and faster reaction to market changes by being able to use holistic global and local optimization algorithms in a collaborative value chain. • Reduced complexity of production systems by at least an order of magnitude through an interoperable de-centralised architecture approach and interoperability frameworks. • Productivity increase of about 30% through the enhanced utilisation of resources and information taking a holistic view in a collaborative value chain. • Strengthened market position of European producers of laser-based manufacturing equipment, their suppliers and of the users of the equipment. • Reinforced capacity to manufacture high-quality and innovative products and to penetrate new application areas.** Types of action:** a. Research & Innovation Actions b. Coordination and Support Actions