

## Knowledge Management & Innovation in 4.x (.0 & h) industrial context: Moving QMS (Quality Management System) from “problem solving” toward “expandable rationality”.

Knowledge management, being defined as the process of capturing, distributing, and effective use of knowledge<sup>1</sup>, is a process that is utilized by individuals and organizations in either a conscious or unconscious way.

Most organizations have already implemented multiple forms of knowledge management structures and tools including AI (Artificial Intelligence) inside industrial engineering, methods, marketing, or research laboratories departments. If it seemed possible to manage knowledge in the past, then why knowledge management is today coming back as an important research scope for many industries when big data world, advanced algorithms and unsurpassed computer power are available? This question seems to be a paradox. Indeed, in their daily life, individuals are supposed to act by mobilization of available knowledge; on the other hand, knowledge “production” seems to be the ultimate aim of any scientific activity; and finally, the nature, the validity or the knowledge production environment, are analyzed by deep epistemological studies<sup>2</sup>. Nevertheless, a new knowledge management crisis is rising in today's industries and associated production lines, like for instance semiconductor industry (SI), when they are challenged by short product life cycle that leads to the continuous development of new products and technologies. In addition, increasing product demand diversity and volume by customers, that often result in high-mix / low-volume production turn manufacturing into a highly complex production environment. Success in such a competitive environment requires not only sustainable capacities but also their efficient utilization rate which may be ensured dynamically through appropriate, optimized, and sustainable QMS (Quality Management System) strategies. Examples can be found in many organizations and department types, highlighting the fact that all operational actors (eg: individuals, Operators, Technicians, Engineer's, administrative, ...) or groups ( R&D, production, process, equipment, human resources (HR), suppliers, customers, purchasing, finance,...), are not able anymore to share they competency in a coherent and efficient way. Sharing competency, and by consequence managing knowledge, in such dynamic context becomes the actual challenge to face.

This presentation highlights QMS & Knowledge Management operational challenges in 4.x (.0 – Technological & .h -Human) SI industrial context, where Human-Tool interfaces & IA have already started to be implemented. Based on operational case studies, it is shown how a methodology called C-K FMEA<sup>3</sup>, complementary to Lean and Design Thinking methods, allows to move from “problem solving” to “expandable rationality”<sup>5</sup> and, by this way, sustain QMS to reach IATF<sup>6</sup> operational targets in such dynamic industrial & R&D environment.

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<sup>1</sup> Davenport, Thomas H. (1994), Saving IT's Soul: Human Centered Information Management. Harvard Business Review, March-April, 72 (2) pp. 119-131.

<sup>2</sup> Knowledge management for innovation. Literature review. ANRT Convention, March 2000, Ecole des mines de Paris.

<sup>3</sup> C-K Theory: → A.Hatchuel, B.Weil. P.Le Masson Mines paris tech

<sup>4</sup> Benjamin Cabanes, Stéphane Hubac, Pascal Le Masson, Benoit Weil - Improving an operations management process based on design theory: the case of FMEA in the semiconductor industry – June 2020 -Submitted to JOOM (J. Operating Management)

<sup>5</sup> B.Cabanes, S.Hubac; P.Le Masson; Weil, B.Benoît FROM FMEA AS A PROBLEM SOLVING METHOD TO A DESIGN-ORIENTED PROCESS: TOWARD A DESIGN PERSPECTIVE OF FMEA. International\_Design\_Conference 2016.

<sup>6</sup> IATF Norm 16949:2016

***Biography:***

Stephane Hubac is a Manufacturing Science Fellow (Advanced Process & Equipment Control & Knowledge management) and presently works in transverse projects at STMicroelectronics. He has been Chairman of ST France Technical College Board of fellows (2016-2019). Since 1981, he has worked in many disciplines within the semiconductor industry including memory device design, manufacturing, process & equipment engineering in lithography, dry etching and dielectric deposition, process control, Quality methods implementation in Manufacturing & R&D contexts. Its special interests include R&D on DFM methods, yield enhancement, productivity, process control and scientific practices in industrial context. He has joined 300mm Crolles 2 Alliance (Freescale, NXP, ST) in the initial phase of the project as a project manager; responsible for the selection of 300mm plasma etching & dry stripping equipment, then manufacturing and R&D ramp-up as an AREA Manager (Etch, Strip, APC programs). He has lead the Crolles 2 Alliance APC project, ISOTS audit supervisor for Fab qualification and Process Control Area manager in the Alliance 300mm R&D facility at Crolles, France and has been involved as a work package leader in ENIAC European Project IMPROVE (WP3: Predictive Maintenance), and INTEGRATE (WP5: data Analysis & Yield). Associated with Grenoble Alps University as a visiting Professor on QMS, process control and plasma physics, he is also ST representative @ "Industrial Club" of Grenoble INP university and @ Grenoble IMEP-2 doctorate school.