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# UbiDM: AN INNOVATIVE HYPOTHESIS FOR PRODUCT DESIGN AND INDUSTRIAL ENGINEERING

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**ABSTRACT**

Ubiquitous was quickly developed and mainly used to benefit people with the introduction of the all-around technology in the early 80s. In this document, the authors propose the use of UbiDM in the design, production and development of a new paradigm, UbiDM1 the authors suggest (Design and Manufacture via Ubiquitous Computing Technology). The fundamental component of UbiDM is the usage by the universal computing technology of all product lifecycle data for product design and manufacture. The new paradigm can handle several issues that have not been effectively addressed in the earlier production paradigms. In particular, the notion of UbiDM will cover the following aspects: (1) why UbiDM is needed; (2) the essence of UbiDM; (3) technology enabling; Key Words: UbiDM; u-Factory; Ubiquitous engineering systems; product management lifecycle; paradigm of production; Ubiquitous engineering of systems; etc.

**Keywords:** UbiDM; u-Manufacturing; u-Factory; u-Design; Ubiquitous systems engineering; Product lifecycle management; Manufacturing paradigm

## 1. Introduction

"Manufacturing" is the definition of "production" throughout the history of mankind, in particular through physical work and machines, on a large scale, and that meaning has altered little.(Burawoy & Wright, 2001), However, industrial techniques have altered considerably in connection with the growth of new technology. Thousands of years earlier, the Industrial Revolution had produced goods using tools and crafts in their homes, but people began to employ machinery for manufacturing in the middle of the 18th century, after the revolution. In the early 20th century, Fordism came with the AA truck and converted a production model from small-volume manufacture into mass production. When high quality, cheap Japanese products began to overrun the US in the 1970s, a flexible manufacturing method was introduced to minimise labour costs. This threat was met(Burawoy & Wright, 2001)since then, manufacturers have made enormous efforts to cut labour costs and improve productivity and quality dramatically. In order to better engineering, numerous new paradigms were developed utilising mathematical principles and various technologies such as lean manufacture, holonics, agile production, etc. Computers and the web have accelerated globalisation, accelerated industrial specialisation, and established in the latter half of the 20th century the e-manufacturing paradigm for the so termed DABASA. In this regard, E-Master Manufacturing is the world's largest developer, manufacturer and seller through worldwide information interchange as well as in a digital era in which computers can virtually simulate and analyse the design through to production via digital information.

**2. Need of UbiDM**

Recently, the corporate environment as represented by Web 2.0 has transitioned into the user-oriented mind-set. As environmental issues have attracted international attention, policies such as the (Guidelines on electric and electronically produced waste disposal), (manufacturers recycle system) and ELVs (automotive disposal instructions) are implemented which make recycling and disposal accountable to manufacturers. Of course, this calls for the increase in production and production innovations which demand manufacturers to customise and manufacture by exchanging data with outside parties (e.g. consumers, maintainers, recyclers) (recycling, disposal). In fact, many specialists believe that the entire sector of life is in the omnipresent society. Several kinds of intelligent computers make the lives of individuals easier and more comfortable in a world that is ever present(Lee, 2003).

**3. UbiDM**

UbiDM is a paradigm for redesigning production environments with all-round computer technology employing the complete product life cycle. The primary components of the UbiDM paradigm are in-house information gathering in real time and transparent interchange of information across stakeholders throughout the product cycle. UbiDM has basically the following qualities as depicted in Figure 3.1. It covers the manufacturing of related activities over the product lifecycle; collects and uses information transparently at the individual item level from product and product contexts; supports collaboration activities in real time; supports integrated MT manufacturing system; IT (information technology) and UT (ubiquitous technology); and management and production risk analysis.(McFarlane et al., 2003)

- "MT, IT and UT integration One characteristic of UbiDM is that technical challenges are quite important compared to other manufacturing paradigms. In order to deliver valuable services to each partner for effective manufacturing, IT, communication and UT data gathering and transmission over various product lifetimes, MT is incorporated in UbiDM." With the integration of these technologies progressing relatively fast, technological difficulty unresolved in production situations can be handled and developed.
- "Extension to the whole product life cycle of the product coverage UbiDM covers the coverage of current BOL extension into further phases of sales, remediation, recycling and disposal. When a product is discharged from the production sites, the product

information is tough to handle when it is used in a wide array of circumstances. Improving accessibility and traceability via UT nonetheless provides enhanced product management to cover the product's whole life"(Valckenaers et al., 1998)

- "Field data collected throughout One of UT's features is to collect real data from all across the world. This particular feature promotes the use of data in a UbiDM environment by gathering and transferring valuable field data. This enhances information. Data collecting levels can be significantly segregated as they not only comprise information about a product but also the surroundings"(Bodenhoefer et al., 2004)

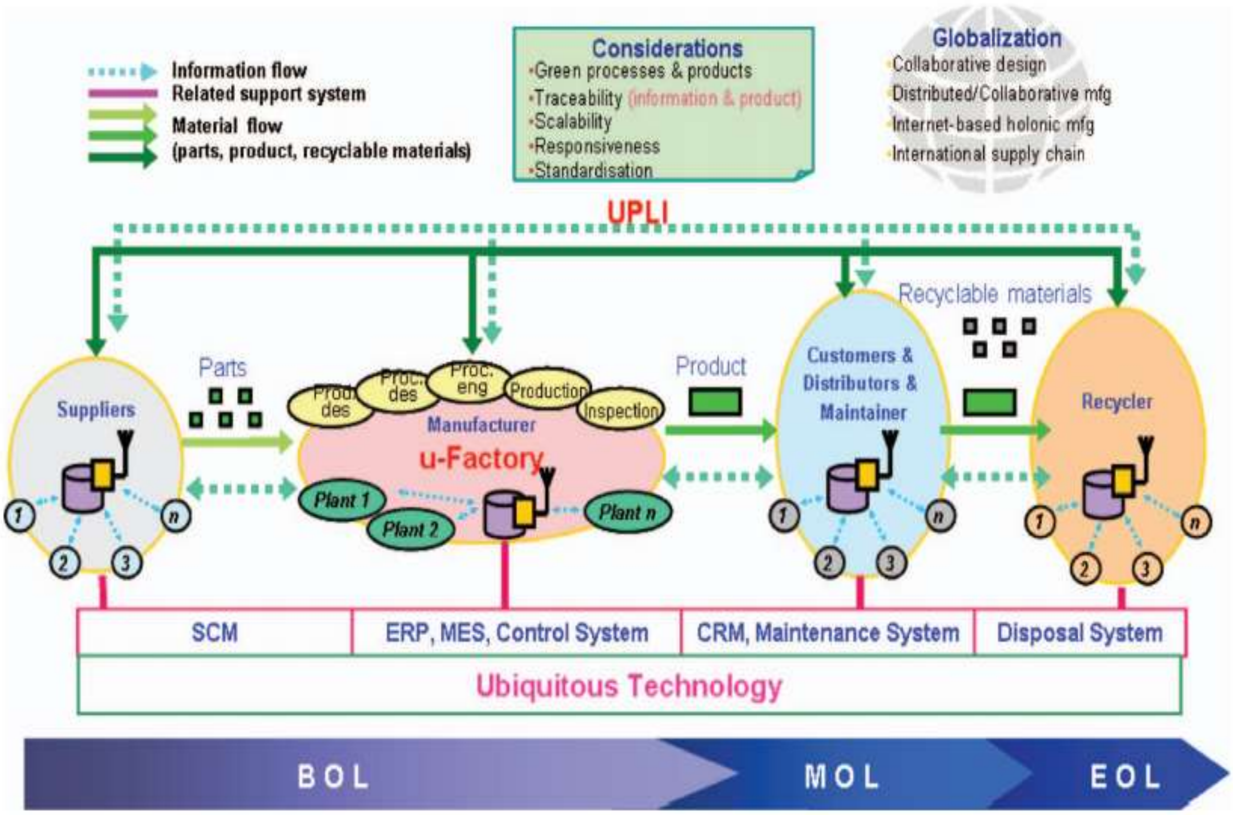


Figure 3.1 "Conceptual framework for UbiDM"(Lee, 2003)

- "Collaboration amongst stakeholders through transparent information sharing and utilisation UbiDM uses useful information by providing field information collected by UT openly and transparently among many stakeholders and application systems across the entire product life cycle." The creation of interoperable infrastructure of information across different parties is crucial in this connection. In distributed circumstances, each stakeholder will benefit from enhanced cooperation through transparent exchange and information commentary.
- The extent of the information gathering, exchange and use, real-life and product individuality UbiDM has numerous different qualities in the collection, exchange, and use of information as applicable to the UT compared to existing techniques. "Firstly it implies the generality of information collection where data can be obtained without users or systems recognising data gathering as opposed to conventional systems where operators manually input and scan. At the same time information can be guaranteed by reducing the delay and loss of time between data collection, transmission and use. Data management is also possible on a product level, because a unique ID is provided to each product and data is collected from the product identifier"(Suh et al., 2008).

## 4. Product development phase application

u-Design UbiDM can be used for product development to leverage customer information or provide a collaborative environment for those who are involved in product development, from analysis of consumer demands, to the product design in-use consumer information application for product development. To make the context more sensitive, to wirelessly interact and store information, devices can obtain important information and return it via embedded systems for productive development when such duties are carried out. Designers can design or improve existing items through virtually the patterns and environment of their customers. Support for product development cooperation between players. In addition, with the use of the information infrastructure, such as the UPLI for real-time communication and information exchange, the development of collaboration activities for many stakeholders could be easily and international.

**4.1. Inmanufacturingphase**

"u-Factory If UPLI is at the centre of the horizontal strategy, then u factory is the core of the vertical strategy since UbiDM begins in the realm of production. The u-Factory can be defined as a factory where transparent and independent manufacturing is performed through interactions among people, machines, materials and systems using information from a product life cyury, everywhere and at all times. It may be employed in various industries like steel, machine equipment, vehicles, aircraft, etc. By developing transparent and independent production environments, the following applications can be implemented by using ubiquitous technology" (Gunasekaran et al., 1993).

- Reliable information interchanges between man-resource-product-system infrastructures. "A transparent shop floor can be realised by gathering and exchange of real time information on production status, facility conditions etc. with higher level systems such as MES, ERP and other data systems." In addition, a free exchange of the obtained information from the store with outside settings through USPLI can lead to collaborative manufacturing.

- "Resources that is competent to carry out intelligently tasks and to sensitise oneself. Resources can monitor, diagnose health conditions and intelligently determine operations based on sensor network information. In emergencies, alternate resources for the same operation can be identified without employee intervention via context-based mutual communication. In addition, self-configuring is enhanced to add or delete new resources using IPv6-based unique IDs and resource information standardisation."
- "Comfortable, safe store floor, human-centered. Workers can get the needed information and report the operating status while moving using the mobile device and wireless Internet. The use of all types of sensor networks, contexts etc. can construct jobs that recognise hazardous conditions and prevent and report hazardous factors in advance."

**4.2Products to in-use stage**

u-Maintenance UbiDM can now handle MOLs which previous paradigms have not been taken into account. "Due to client history, customised repair and upgrade services may, at a time when product usage and maintenance activities occur primarily, be offered for each customer, for each customer or in efficient maintenance activities to be carried out in each product."

- Customized repair and upgrading services. Valuable recommendations for the repair or improvement of individual items in their various contexts can be provided with in-use data recorded by a system embedded in a product. In addition, before failure, clients can proactively obtain the required servicing.

- Customer-based efficient service maintenance. A service provider can supply data and figures from the BOL via an record infrastructure such as UPLI, including with product use information. The maintainer therefore may detect more correctly and efficiently the core cause of the breakdown and systemically control use/maintenance history.

**4.3. Product recycling and disposal stage**

"u-PRM (Product Recovery Management) EOL is an additional stage that UbiDM can cover. Each product is diagnosed and the decision is taken in the disposal and recycling stage, with varying standards". Automatic operations of demounting can also be controlled for part remanufacturing.

- Diagnostic status of different specifications items the UPLI collects information from the BOL distributes (in-use environment, repair history, partial exchange registers, etc.) and the MOL information (in-use environment). Based on this information, the status of a portion of a product can be diagnosed so that recyclers can determine whether each part should be disposed of, reproduced or recycled into a product. (Valckenaers et al., 1998)
- Automated of partial disassembly operations for remanufacturing i.e You may automate the decommissioning process needed for remanufacturing components, by generating decomposed plans using product information like CAD, BOM and assembly instructions.(Westkämper & Jendoubi, 2003).

## 5. Conclusion

Unlike traditional paradigms, some societal challenges could be expected to be addressed by a paradigm like mass adaptability, environmental considerations and widened cooperation. Various software and technologies must converge in order to achieve UbiDM, including MT, IT, UT. Convergence is necessary. Even the academic community has not, however, successfully managed this paradigm, and this paradigm is rarely used throughout the world. Several elements have to be addressed and addressed, including the definition of essential UbiDM technologies, the appropriate role division and collaborative research, in order to maximise the advantages of each participant and to establish systematic approaches and tactics to achieve UbiDM. We have seen countless successful examples of crisis and suffering organisations in the past offering new revolutionary paradigms in the production and conquest of clouds employing the new paradigm. In order to address the challenges facing most manufacturers such as the FTA's borderless competition (Free Trade Agreement), the emergence of customer-oriented Web 2.0 and the developing environmental issues we must pay particular attention to UbiDM in the production paradigm, Blue Ocean.

## References

Bodenhoefer, K., Schneider, A., Cock, T., Brooks, A., Sands, G., Allman, L., Simon, M., Chong, S. K., Yang, K., & Delannoy, O. (2004). *Environmental life cycle information management and acquisition-first experiences and results from field trials*.

Burawoy, M., & Wright, E. O. (2001). Sociological marxism. In *Handbook of sociological theory* (pp. 459–486). Springer.

Gunasekaran, A., Martikainen, T., & Yli-Olli, P. (1993). Flexible manufacturing systems: An investigation for research and applications. *European Journal of Operational Research*, *66*(1), 1–26. https://doi.org/https://doi.org/10.1016/0377-2217(93)90202-X

Lee, J. (2003). E-manufacturing—fundamental, tools, and transformation. *Robotics and Computer-Integrated Manufacturing*, *19*(6), 501–507.

McFarlane, D., Sarma, S., Chirn, J. L., Wong, C., & Ashton, K. (2003). Auto ID systems and intelligent manufacturing control. *Engineering Applications of Artificial Intelligence*, *16*(4), 365–376.

Suh, S.-H., Shin, S.-J., Yoon, J.-S., & Um, J.-M. (2008). UbiDM: A New Paradigm for Product Design and Manufacturing via Ubiquitous Computing Technology. *Int. J. Comput. Integr. Manuf.*, *21*(5), 540–549. https://doi.org/10.1080/09511920802023012

Valckenaers, P., Van Brussel, H., Wyns, J., Bongaerts, L., & Peeters, P. (1998). Designing holonic manufacturing systems. *Robotics and Computer-Integrated Manufacturing*, *14*(5–6), 455–464.

Westkämper, E., & Jendoubi, L. (2003). Smart factories-manufacturing environments and systems of the future. *Proceedings of the 36th CIRP International Seminar on Manufacturing Systems*, 13–16.