The power of product platforms in mass customisation

Article *in* International Journal of Mass Customisation · January 2005

DOI: 10.1504/IJMASSC.2005.007348

CITATIONS
42

READS
1,008

3 authors:

George Q. Huang
The University of Hong Kong
394 PUBLICATIONS **8,190** CITATIONS
SEE PROFILE

Timothy W. Simpson
Pennsylvania State University
356 PUBLICATIONS **13,021** CITATIONS
SEE PROFILE

B. Joseph Pine II
Strategic Horizons
45 PUBLICATIONS **11,920** CITATIONS
SEE PROFILE

The power of product platforms in mass customisation

George Q. Huang*

Department of Industrial and
Manufacturing Systems Engineering
University of Hong Kong, Pokfulam Road,
Hong Kong, PR China
Fax: 852–28586535 E-mail: gqhuang@hku.hk
*Corresponding author

Timothy W. Simpson

Departments of Mechanical and Nuclear Engineering and
Industrial and Manufacturing Engineering
The Pennsylvania State University
University Park, 16802 PA, USA
Fax: 1–814–8634745 E-mail: tws8@psu.edu

B. Joseph Pine II

Strategic Horizons LLP
105 Woodland Trace
Aurora OH 44202–8076, USA
E-mail: BJP2@aol.com

Abstract: This paper serves as an extended editorial for this inaugural issue of the *International Journal of Mass Customisation*. Its main objective is to give a brief overview of the recent developments in Mass Customisation (MC) research and practices, although more comprehensive reviews should be referred to existing review articles (Silveira *et al*., 2001; Simpson, 2005). For this new journal, more position papers have been planned to appear. Materials are mainly drawn from well-cited monographs, conference proceedings and articles published on various MC topics. This new journal aims to serve the MC community as a major forum to exchange substantial ideas and share experiences, complementing newsletters and resources maintained at various websites (*e.g.*, www.mass-customisation.org/; www.mass-customization.de/; www.mcustomization.de/).

Keywords: mass customisation; platform; commonality; modularity; product development; supply chain; operations management; agile manufacturing.

Reference to this paper should be made as follows: Huang, G.Q., Simpson, T.W. and Pine, II, B.J. (2005) 'The power of product platforms in mass customisation', *Int. J. Mass Customisation*, Vol. 1, No. 1, pp.1–13.

Biographical notes: George Q. Huang received his BEng and PhD degrees in Mechanical Engineering from Southeast University in China and Cardiff University in the UK in 1983 and 1991, respectively. Dr. Huang is Associate Professor at The University of Hong Kong. His main research interests include platform products for mass customisation, supply chain configuration, grid design and manufacturing, and computational game theory. He has published extensively on these topics, including over 70 journal papers, two monographs entitled 'Cooperating Expert Systems in Mechanical Design' and 'Internet Applications in Product Design and Manufacturing' respectively, and an edited reference book entitled *Design for X: Concurrent Engineering Imperatives*. Dr. Huang is Chartered Engineer and a member of IEE (UK), HKIE, IIE and ASME.

Dr. Timothy Simpson is Associate Professor of Mechanical Engineering and Industrial Engineering at Penn State University. Dr. Simpson received his BS degree in Mechanical Engineering from Cornell University in 1994 and his MS and PhD degrees in Mechanical Engineering from Georgia Tech in 1995 and 1998, respectively. His teaching and research interests include product family and product platform design, mass customisation and product dissection. He is the Director of the Product Realisation Minor at Penn State and is an active member of ASME, AIAA, ASEE and SAE.

B. Joseph Pine II is an internationally acclaimed author, speaker and management advisor to *Fortune 500* companies and entrepreneurial startups alike. He co-founded Strategic Horizons LLP, a thinking studio dedicated to helping businesses conceive and design new ways of adding value to their economic offerings. Pine and his partner James H. Gilmore wrote the best-selling book *The Experience Economy: Work Is Theatre and Every Business a Stage* (Harvard Business School Press, 1999), which explains how goods and services are everywhere being commoditised; what customers want today are *experiences* – memorable events that engage each customer in an inherently personal way. They extended their ideas more recently with the e-Doc *The Experience IS the Marketing* (BrownHerron, 2002), available exclusively on Amazon.com, and co-edited *Markets of One: Creating Customer-Unique Value through Mass Customization* (Harvard Business School Press, 2000). Pine also wrote the award-winning book *Mass Customization: The New Frontier in Business Competition* (Harvard Business School Press, 1993), as well as numerous articles for the *Harvard Business Review*, *The Wall Street Journal*, *Chief Executive, Worldlink*, *Health Forum Journal*, and *CIO*, among others. Prior to beginning his writing and speaking activities, Pine held a number of technical and managerial positions with IBM and is now Visiting Professor at the University of Amsterdam.

1 Introduction

The 20th century was an era of mass production. While manufacturers strove for productivity and quality, keen competition in the global market has redefined the way they do business in the 21st century. The new edge of competitiveness is total customer experience. One key dimension is to provide sufficient product variety to meet diverse customer requirements, business needs and technical advancements while maintaining economies of scale and scope within manufacturing processes. This new paradigm was first coined as 'Mass Customisation (MC)' by Davis in *Future Perfect* in 1987. The term

took its root since the publication of the book *Mass Customization* (Pine II, 1993) and another book *Agile Product Development for Mass Customization* (Anderson and Pine II, 1997). Gilmore and Pine II (2000) was a more recent collection of Harvard Business Review articles on MC. This last decade in the 20th century was a busy decade for MC. Several authoritative books and articles were published. Wheelwright and Clark (1992), McGrath (1995), Erixon (1996), Sanderson and Uzumeri (1997), Meyer and Lehnerd (1997), Robertson and Ulrich (1998), Ho and Tang (1998), O'Grady (1999), Baldwin and Clark (2000) are among some of the most widely and frequently quoted works nowadays. They are all based on substantial insights and experiences gained from industrial cases collected among some leading manufacturing and service companies. In addition to cautions (*e.g.*, Zipkin, 2001), these works highlight one common success factor in achieving MC: the use of the concept of product platforms.

The scope of the definitions of product platforms range from narrow to broad. Some of the widely adopted definitions are as follows:

- A set of common components, modules, or parts from which a stream of derivative products can be efficiently developed and launched (Meyer and Lehnerd, 1997).
- A collection of the common elements, especially the underlying core technology, implemented across a range of products (McGrath, 1995).
- The collection of assets [*i.e.*, components, processes, knowledge, people and relationships] that are shared by a set of products (Robertson and Ulrich, 1998).
- A set of subsystems and interfaces intentionally planned and developed to form a common structure from which a stream of derivative products can be efficiently developed and produced (Muffatto and Roveda, 2002).

Companies have successfully used product platforms to control the complexity (*e.g.*, high production and inventory cost and long time to market) induced by product proliferation to a manageable and competitive level. Four basic platform strategies are evident in successful applications. They are commonality, modularity, scalability and postponement. First, the commonality strategy is one of the best-known features of product platforms. Through the commonality strategy, the components are standardised and then shared as much as possible without compromising the variety of the end products entering the market. Second, modularity is another essential strategy widely practiced in industries. In the modularity strategy, standardised modular options are selected and then configured into different end products according to specific market and business needs. The modularity approach implies another technique of multi-functionality. That is, modular options are often designed to provide the best-proven combination of multiple functions commonly used in a family of products. Third, the postponement strategy involves arranging product structures so that early proliferation of part variety is avoided and variation is allowed and enabled as late as possible in the manufacturing process. Finally, another platform strategy is scalability, which refers to the serialisation and the ranging of product parameters that have to be changeable. Based on these basic strategies, Suzue and Kohdate (1988) have formulated some formidable yet simple-to-use tools and techniques for Platform Product Development (PPD) and MC.

Product variants derived from a platform constitute a product family. The power of the platform lies in the underlying product architecture in each family. Ulrich (1995) describes *product architecture* as 'the scheme by which the function of the product is allocated to its physical components.' The product architecture is formally defined as:

- the arrangement of *functional elements*
- the mapping from *functional elements* to *physical components*
- the specification of the *interfaces* among interacting physical components.

A product architecture can be either *modular*, if there is a one-to-one or many-to-one mapping of functional elements to physical structures, or *integral*, if a complex or coupled mapping of functional elements to physical structures and/or interfaces exists. Both types of architecture have been widely used in industries as summarised by Simpson (2005).

Having discussed the various meanings of product platforms in the MC context, the remainder of this paper will highlight some of the successful applications of product platforms and MC across different industrial sectors in Section 2. Section 3 mentions research activities in the MC field with an intention to stimulate more articles reporting on the positions of various aspects of MC research and practices from different perspectives within the MC community. Section 4 presents some of the well-known fora and events taking place at the international and national levels. This describes the environment from which the *International Journal of Mass Customisation* has emerged. Editorial vision and scope of the new journal are summarised in Section 5. More general information about MC can be found at some excellent sources (*e.g.*, http://www.mass-customisation.org/; http://www.mass-customization.de/; and www.mcustomization.de/).

2 Industrial practices

Industrial applications and research activities related to MC have been widely reported at conferences, industrial newsletters and research articles; many more practices are not openly reported. They cover a wide range of industrial sectors ranging from manufactured mechanical, electronics, mechatronics, textile and footwear products to software and service products. The website at http://www.mass-customisation.org/ presents a list of some MC companies. This section extracts some materials from Simpson (2005) and Pine II (1993).

According to Pine II (1993), Dell Computer Corporation is the world's premier mass customiser. The secret of its success is its cash conversion cycle – the time between when it has to pay its suppliers for personal computer components and when its customers pay it for the final products using those components. Dell has extended its business model beyond simple PCs to servers, storage units, network devices and now even services. Lutron Electronics of Coopersburg, Pennsylvania, was one of the very first mass customisers of lighting controls for offices, hotels, homes, among others. After working with individual customers to develop 100+ lighting control products, Lutron redesigns its product line around 15–20 standard components that can be configured into the same 100+ models from which customers could initially choose (Pessina and Renner, 1998). Lenscrafters eliminated the old batch production system for eyewear by encapsulating a

production facility into each store, giving every customer a custom pair of eyeglasses in about an hour.

Sony has strategically managed the development of its Walkman® products using carefully designed product platforms and derivatives (Sanderson and Uzumeri, 1997). Similarly, Kodak's product platform-based response to Fuji's introduction of the QuickSnap® single-use camera in 1987 enabled them to develop products faster and more cheaply, allowing Kodak to regain its market share and eventually overtake Fuji (Wheelwright and Clark, 1995). Black & Decker (Lehnerd, 1987) and John Deere (Shirley, 1990) have benefited from platform redesign efforts to reduce variety in their motor and valve lines, respectively.

McGraw-Hill's Primis system for mass customising college textbooks to individual classes actually caused competitors to leave the business, as they did not have a library of textbook chapters big enough to compete. Progressive Insurance mass customises both its automobile policies (at increased margins) and its claims adjustment process (at lower costs) to hand checks to customers at the site of the accident itself. For service products, Hertz' #1 Gold programme bypasses the standardised counter system to deliver each individual to his rental car of choice (also at lower costs). Whirlpool's Quality Express system efficiently delivers appliances to the exact order of individual dealers, while Cemex of Mexico delivers its commodity cement to individual construction sites within two hours of the order being taken. One company that effectively uses the internet, Land's End, has probably received more press in the past year than any other mass customiser. Companies as diverse as IC3D in the USA, Adidas in Germany and Possen in the Netherlands are all focused on this MC opportunity.

Simpson (2005) groups platform-based MC practices in industries into two categories in accordance with the three key platform strategies previously (commonality, modularity and scalability). They are Module-Based Product Families and Scale-Based Serialisation of Product Families. There are numerous examples of module-based product families. Some of the more frequently quoted examples follow:

- Sony has built all of its Walkman® models around key modules and platforms and used modular design and flexible manufacturing to produce a wide variety of quality products at low cost. This strategy allowed Sony to introduce 250+ models in the USA in the 1980s (Sanderson and Uzumeri, 1997).
- Hewlett Packard successfully developed several of their inkjet and laserjet printers around modular components to gain benefits of postponing the point of differentiation in their manufacturing and assembly processes (Feitzinger and Lee, 1997).
- Nippondenso Co. Ltd. makes an array of automotive components for a variety of automotive manufacturers using a combinatoric strategy that involves several different modules with standardised interfaces. For instance, 288 different types of panel meters can be assembled from 17 standardised subassemblies (Whitney, 1993).

As stated previously, scale-based product families are developed by scaling one or more variables to 'stretch' or 'shrink' the platform and create products whose performance varies accordingly to satisfy a variety of market niches. While some consider scale-based product families to be a subset of module-based product families (see Fujita and Yoshida, 2001), platform scaling is a common strategy employed in many industries. For example:

- Boeing developed many of its commercial airplanes by 'stretching' the aircraft to accommodate more passengers, carry more cargo and/or increase flight range (Sabbagh, 1996).
- Honda developed an automobile platform that can be stretched in both width and length to realise a 'world car' after failing to satisfy Japanese and US markets with a single platform (Naughton, *et al*., 1997).
- Rolls Royce scaled its RTM322 aircraft engine by a factor of 1.8 to realise a family of engines with different Shaft Horse Power (SHP) and thrust (lb) (Rothwell and Gardiner, 1990).
- Black & Decker developed a family of universal motors for its power tools in response to a new safety regulation: double insulation (Lehnerd, 1987). Prior to that, they used different motors in each of their 122 basic tools with hundreds of variations.

Platforms also promote better learning across products and can reduce testing and certification of complex products such as aircraft (Sabbagh, 1996), spacecraft (Caffrey, *et al*., 2002) and aircraft engines (Rothwell and Gardiner, 1990). In the automotive industry, platforms also enable greater flexibility between plants and increased plant usage – sharing underbodies between models can yield a 50% reduction in capital investment, especially in welding equipment – and can reduce product lead times by as much as 30% (Muffatto, 1999). Firms using a platform-based product development approach in the automotive industry recently gained a 5.1% market share per year, while firms that did not lost 2.2% (Cusumano and Nobeoka, 1998).

3 Research activities

MC has been more an art than a science. Its successful implementation requires substantial technical, strategic and management skills. Researchers have been working hard in order to create more scientific and systematic frameworks, methods and techniques and tools to facilitate the adaptation and implementation of MC. Simpson (2005) has used the following dimensions to group research activities and has expanded each dimension in his article:

- product family planning and platform development
- quantifying the benefits and drawbacks of platform-based product development
- modelling customer demand for product families
- Design for Manufacturing and Assembly (DFMA)
- support for small and mid-size manufacturer
- overcoming organisational barriers to platform-based product development.

In this new journal, we have been inviting and planning a number of comprehensive position and review papers to appear. These forthcoming literature review papers would identify different dimensions for further research from three different perspectives of Engineering Design and Manufacturing (ED&M), Operations Management (OM) and

Information Technology & Artificial Intelligence (IT/AI). They also represent three general groups of researchers of the MC research community. It is not difficult to come across a few so-called 'cradles' where substantial research has been pioneered and conducted through several PhD projects with the support of industrial and/or government grants. Examples include the Systems Realisation Lab (SRL) at the Georgia Institute of Technology, the Center for Innovation in Product Development (CIPD) at MIT and the Advanced Manufacturing Institute (AMI) of HKUST, with many more groups and centres merging in recent years.

It is not possible to search for and list all the research projects related to MC here. However, a shortlist of early projects is presented below so that the readers can estimate the recent exponential explosion from these early projects:

1 Brown, S.E., 'The role, process and content of strategy in pursuing mass customization within firms', *The UK EPSRC GR/R26559/01*, University of Bath, http://gow.epsrc.ac.uk/viewgrant.aspx

2 Du, X.H. (2000) 'Architecture of product family for mass customization', *PhD Thesis*, supervised by Professor Mitchell Tseng, Advanced Manufacturing Institute, Department of Industrial Engineering and Engineering Management, Hong Kong University of Science and Technology (HKUST).

3 *EwoMacs: Entwicklung und Optimierung der Logistikstrukturen für Mass Customization in der Schuhindustrie*, http://www.mcustomization.de/english/3_projects/index_3.htm

4 Gonzalez-Zugasti, J.P. (2000) 'Models for platform-based product family design', *PhD Thesis*, supervised by Professor Kevin Otto, Center for Innovation in Product Development (CIPD), MIT, Cambridge, MA: MIT Mechanical Engineering, June.

5 Jiao, J.X. (1998) 'Design for mass customization by developing product family architectures', *PhD Thesis*, supervised by Professor Mitchell Tseng, Advanced Manufacturing Institute, Department of Industrial Engineering and Engineering Management, Hong Kong University of Science and Technology (HKUST).

6 Johansson, C. and Ossbahr, G. *Mass-Customized Assembly of Electronic Products*, Department of Production Systems, Linköpings Universitet; Öberg, Mats, Ericsson Mobile Communications AB.

7 Kehoe, D., 'Future supply innovations (fusion): next-generation supply mechanisms for high-volume production of customised products', *The UK EPSRC GR/R13128/01*, University of Liverpool, http://gow.epsrc.ac.uk/viewgrant.aspx

8 Liker, J., 'Manufacturing and supply chain logistics strategies for mass customization', *Value Chain Analysis and Management Program (VCAP)*, Department of Industrial and Operations Engineering College of Engineering The University of Michigan, http://www.engin.umich.edu/VCAP/research.html

9 MacCarthy, B.L., 'Mass customisation for manufacturing enterprises: fundamental science strategic decisions systems design', in H.J. Efstathiou (Ed.) *The UK EPSRC GR/N11742/01*, University of Nottingham; University of Oxford, http://gow.epsrc.ac.uk/viewgrant.aspx

10 Martin, M.V. (1999) 'Design for variety: a methodology for developing product platform architectures', *PhD Dissertation*, supervised by Professor Kosuke Ishii, Division of Design, Department of Mechanical Engineering, Stanford University, USA.

11 MC-ProLog, *Development of Production- and Logistics Structures that Should Enable Small and Medium-Sized Enterprises to Manufacture Products According to the Concept of Mass Customization (MC)*, German Federation of Industrial Cooperative Research Associations http://www.mcustomization.de/english/3_projects/index_3.htm

12 NSF ITR: Collaborative Research, *An Information Management Infrastructure for Product Family Planning and Mass Customization*, NSF Grant Nos: ISS-0325402, ISS-0325321, ISS-035279, and ISS-03255415.

13 NSF ITR: Collaborative Research, *Information Technology Issues for Complex Engineering Product: Mass Customization in Geographically Distributed Environments*, NSF Grants.

14 Pedersen, K. (1999) *Designing Platform Families: An Evolutionary Approach to Developing Engineering Systems*, Fall.

15 Pederson, K. (1999) 'Designing platform families: an evolutionary approach to developing engineering systems', *PhD Thesis*, supervised by Professor Farrokh Mistree, System Realization Lab, School of Mechanical Engineering, Georgia Institute of Technology, USA.

16 Siddique, Z. (1999) 'Common platform development: designing for product variety', *PhD Thesis*, supervised by Professor David Rosen, System Realization Lab, School of Mechanical Engineering, Georgia Institute of Technology, USA.

17 Simpson, T.W. (1998) 'A concept exploration method for product family design', *PhD Thesis*, supervised by Professor Farrokh Mistree, System Realization Lab, School of Mechanical Engineering, Georgia Institute of Technology, USA.

18 Sivard, G. (2000) 'A generic information platform for product families', *Doctor Thesis*, supervised by Professor Torsten Kjellberg, Department of Production Engineering, Royal Institute of Technology, Sweden.

19 Tseng, M.M. (1996) *A Design Approach for Mass Customization*, The Hong Kong University of Science & Technology, HKSAR CERG.

20 Tseng, M.M. (1999) *Modeling Product Family Architecture For Mass Customization*, The Hong Kong University of Science & Technology, HKSAR CERG.

4 International and regional fora

There have appeared a number of major fora for researchers and practitioners to exchange ideas about various aspects of mass customisation. We have grouped them into four categories:

1 special sessions and tracks in international conferences and workshops

2 international conferences and workshops dedicated to MC or related topics

3 professional bodies and interest groups

4 special issues on various MC topics in reputable journals.

It is not possible to mention all the fora exhaustively. Instead, we sample a few of them in this section.

Special sessions and tracks have been organised in several major international conferences in design and manufacturing, operations management and information technology and artificial intelligence. For example, the International Conference on Engineering Design has been traditionally featured with several sessions on modular design and product configuration. Design Engineering Technical Conferences (DETC) organised by American Society of Mechanical Engineers (ASME) has recently included several special tracks related to product family and platform design.

Various symposiums and workshops have been organised by the IT and AI community on MC and related topics. Examples include the AAAI 1996 Fall Symposium on Configuration, the WRKP-96 Workshop on Knowledge Representation and Configuration Problems (in conjunction with KI-96 in Germany), the AAAI'99 Workshop on Configuration, the ECAI 2000 Configuration Workshop, and IJCAI-01 Workshop on Configuration in conjunction with the Seventeenth International Joint Conference on Artificial Intelligence (IJCAI-2001).

An increasing number of papers related to MC have appeared in international management conferences. For example, the International Product Development Management Conferences (IPDMC) has traditionally been featured with a few papers on modular product structuring and platform. In 2003, IPDMC had a special session on 'Product Modularity', in addition to a few more papers related to MC in other sessions. Papers related to MC topics have regularly appeared at INFORMS Annual Meetings. For example, a cluster dedicated to 'Mass Customisation in Manufacturing' was organised in 2004 INFORMS Annual Meeting. The cluster includes four tracks on 'Mass Customisation', 'Configuration Systems for Mass Customisation', 'Mass Customisation, Demand and Supply Chain Perspective', and 'Strategic Implications of Mass Customisation'.

In addition to the above general conferences, there have been a few workshops, seminars, meetings and conferences especially dedicated to various aspects of MC. The 'WDK Workshop on Product Structuring' series, started in 1995 and in its 7th offering in 2004, may be one of the first formal professional events related to MC, focusing on product structures. The 'World Congress on Mass Customisation and Personalisation (MCP)' series is another major biennial event, started in 2001 in Hong Kong. After its second meeting in Munich in 2003, it returns to Hong Kong in 2005. International Conference on Economic, Technical and Organisational Aspects of Product Configuration Systems was held in June 2004 at the Centre for Product Modeling (CPM) of Technical University of Denmark. The International Mass Customisation Meeting is a new conference in the field to be held in Klagenfurt University, Austria in 2005.

Professional events have also been organised at national and regional levels. As reported in the *Mass Customization Newsletter* (http://www.mass-customization.de/), The University of Information Technology and Management in Rzeszow (Poland) hosted a

mass customisation event on 20–21 April 2004 in Poland, to bring the mass customisation concept closer to entrepreneurs and scientists from Central Europe. Similar events took place in the UK, China and other countries.

All these events are attributed to some enthusiastic colleagues in various professional bodies who initiated, organised and made them successful. We are particularly impressed by the recent inauguration of the International Institute of Mass Customisation and Personalisation (IIMCP at www.iimcp.com), followed by regional and national chapters; examples are the Finnish Institute of Mass Customisation and Personalisation (FIMCP, www.fimcp.fi) and Polish Institute of Mass Customisation and Personalisation. Research centres and groups around the world maintain their own websites and newsletters. A regular mass customisation newsletter is maintained at www.iimcp.com. A new website, MadeForOne.com, has been launched as an online news resource for all aspects of MC. The site contains news about new customised and personalised products. There is also a separate section with news about technologies that enable enterprises to apply MC to their business. These professional bodies, research centres and groups, and websites provide excellent sources of value information about MC concepts and issues in different details.

Enthusiastic events and activities have resulted in a rapidly increasing number of publications of research and practice papers. In the last five years or so, several special issues have been collated in a number of reputable international journals. For example, *Artificial Intelligence for Engineering Design, Analysis and Manufacturing* (*AIEDAM*) has published three special issues: the first in 1998 and the second in 2003 both on 'Configuration' (Darr *et al*., 1998; Soininen and Stumptner, 2003), and the third in 2005 on 'Platform Product Development for Mass Customisation' (Huang *et al*., 2005). *IEEE Intelligent Systems* devoted a special issue to Configuration in 1998 (Faltings and Freuder, 1998). The *International Journal of Production Planning and Control* published a special issue on 'Mass customisation' (McCarthy, 2004). The *International Journal of Concurrent Engineering: Research and Applications* has published a special issue on 'Concurrent enterprising for mass customisation' (Jiao *et al*., 2004). Several special issues are still in press. These special issues include the *International Journal of Flexible Manufacturing Systems on 'Mass Customization'*, *Journal of Intelligent Manufacturing on 'Product Family Design and Development'* and *IEEE Transactions on Engineering Management on 'Mass Customization Manufacturing Systems'*. The frequency and events has highlighted the urgency to establish this new journal.

5 The journal

The *International Journal of Mass Customisation* has emerged from a busy environment as summarised in preceding sections and marked the beginning of a new era of exciting progress in the 21st century. The journal provides an international forum for developing, promoting, disseminating and coordinating the progress in MC-related methodologies, technologies and practices among international professional communities. It is a double-blind refereed quarterly journal that publishes original research and application papers, review papers, research and technical notes, industrial case studies, empirical field studies, tutorials, conference reports, management reports, book reviews, commentaries and news in all areas related to MC. The focus deliberately embraces both industrial and business practices and academic research activities.

The journal invites contributions addressing theories, methods, tools, models, practices and enabling technologies related to all aspects of MC. These aspects include business strategies, organisational structures, management and product information management, market development, strategic product planning, product design, product development and realisation, configuration toolkits, customer co-design and customer interaction, process planning, production planning and scheduling, manufacturing system design and analysis, assembly lines, quality control and planning, logistics and supply chain management, relationship marketing, technical support and customer services, and sustainability, product recycling and disposal.

We are not only interested in manufactured products that are mass customisable, but also including software, service products and experience offerings. Technical papers reporting on the substantial progresses of all aspects of MC are welcome. In particular, we are inviting contributions on positions and reviews of the field from different perspectives. Special issues associated with major international conferences and workshops are being planned and encouraged. We particularly welcome proposals for special issues on MC developments and applications in different sectors such as textiles and footwear, software product lines, education and curriculum design, healthcare, bio-medical engineering, financial and insurance services and professional consultancies. Short communications on industrial application cases and speculative thoughts, and on past and new initiatives, research and industrial projects, are considered of special value to the MC community. In addition to technical papers, we are particularly interested in nontechnical articles reporting on past and forthcoming events in the field of MC all over the world.

6 Concluding remarks

The MC community now has its own journal. The MC research and application activities have expanded, and this field of study has matured rapidly in the past decade. However, considerable research is still needed to help bridge the gap between practice and potential. Together with other major fora, this new journal is a platform for us to make further enthusiastic progress in this exciting MC field. It was not possible to mention all the events and activities that have been taking place in the MC field. The MC community can now take advantage of this new journal to keep each other well informed in the future.

We have been fortunate to be able to gather some leading scholars and practitioners in the MC field from all over the world to join the editorial and advisory board of the journal. With their expert and professional support and advice, the MC community will make this journal an exciting success.

We are very grateful to staff members at Inderscience Publisher for their very rapid and flexible responses and arrangements that made it possible to launch this new journal. We trust that this is only the beginning for us to rely on their reliable professional supports. They will maintain the up-to-date detail about the journal at their website http://www.inderscience.com/ijmassc/.

Acknowledgements

Some materials in this extended editorial are adopted from and based on communications and contributions from colleagues in the field. Gratitude is also extended to Miss Li Li and Mr. Ting Qu for editorial assistance.

References

Anderson, D.M. and Pine, II, B.J. (1997) *Agile Product Development for Mass Customization*, Chicago, IL: Irwin Publishers.

Baldwin, C.Y. and Clark, K.B. (2000) *Design Rules: The Power of Modularity*, Cambridge, MA: MIT Press, Vol. 1.

Caffrey, R.T., Simpson, T.W., Henderson, R. and Crawley, E. (2002) 'The economic issues with implementing open avionics platforms for spacecraft', *20th AIAA International Communications Satellite Systems Conference and Exhibit*, AIAA-2002-1870, Montreal, Quebec, Canada.

Cusumano, M.A. and Nobeoka, K. (1998) *Thinking Beyond Lean*, New York, NY: Free Press.

Darr, T., Klein, M. and McGuinness, D.L. (1998) Special issue on 'Configuration design', *AIEDAM*, Vol. 12, No. 4.

Erixon, G. (1996) 'Design for modularity', in G.Q. Huang (Ed.) *Design for X – Concurrent Engineering Imperatives*, New York, NY: Chapman & Hall, pp.356–379.

Faltings, B. and Freuder, E.C. (1998) Special issue on 'Configuration', *IEEE Intelligent Systems*, Vol. 13, No. 4.

Feitzinger, E. and Lee, H.L. (1997)' Mass customization at Hewlett-Packard: the power of postponement', *Harvard Business Review*, Vol. 75, No. 1, pp.116–121.

Fujita, K. and Yoshida, H. (2001) 'Product variety optimization: simultaneous optimization of module combination and module attributes', *ASME Design Engineering Technical Conferences*, Pittsburgh, Pennsylvania, Paper No. DETC2001/DAC-21058.

Gilmore, J.H. and Pine, II, J.B. (Eds.) (2000) *Markets of One*, Boston, MA: Harvard Business School Press.

Ho, T-H. and Tang, C.S. (Eds.) (1998) *Product Variety Management: Research Advances*, Boston, MA: Kluwer Academic Publishers.

Huang, G.Q., Jiao, R. and Tseng, M. (2005) Special issue on 'Platform product development for mass customization', *AIEDAM*, Vol. 18, No. 1.

Jiao, R., Huang, G. and Tseng, M. (2004) Special issue on 'Concurrent enterprising for mass customization', *CERA*, Vol. 12, No. 2.

Lehnerd, A.P. (1987) 'Revitalizing the manufacture and design of mature global products', in B.R. Guile and H. Brooks (Eds.) *Technology and Global Industry: Companies and Nations in the World Economy*, Washington, D.C.: National Academy Press, pp.49–64.

McCarthy, I (2004) Special issue on 'Mass customization', *Production Planning and Control*, Vol. 15, No. 4.

McGrath, M.E. (1995) *Product Strategy for High-Technology Companies*, New York, NY: Irwin Professional Publishing.

Meyer, M.H. and Lehnerd, A.P. (1997) *The Power of Product Platforms: Building Value and Cost Leadership*, New York, NY: Free Press.

Muffatto, M. (1999) 'Introducing a platform strategy in product development', *International Journal of Production Economics*, Vols. 60–61, pp.145–153.

Muffatto, M. and Roveda, M. (2002) 'Product architecture and platforms: a conceptual framework', *International Journal of Technology Managemen*t, Vol. 24, No. 1.

Naughton, K., Thornton, E., Kerwin, K. and Dawley, H. (1997) 'Can Honda build a world car?', *Business Week*, Vol. 100, No. 7.

O'Grady, P. (1999) *The Age of Modularity*, Iowa City, Iowa: Adams and Steele Publishers.

Pessina, M.W. and Renner, J.R. (1998) 'Mass customization at Lutron electronics – a total company process', *Agility and Global Competition*, Vol. 2, No. 2, pp.50–57.

Pine, II, B.J. (1993) *Mass Customization: The New Frontier in Business Competition*, Boston, MA: Harvard Business School Press.

Robertson, D. and Ulrich, K. (1998) 'Planning product platforms', *Sloan Management Review*, Vol. 39, No. 4, pp.19–31.

Rothwell, R. and Gardiner, P. (1990) 'Robustness and product design families', in M. Oakley (Ed.) *Design Management: A Handbook of Issues and Methods*, Cambridge, MA: Basil Blackwell Inc., pp.279–292.

Sabbagh, K. (1996) *Twenty-First Century Jet: The Making and Marketing of the Boeing 777*, New York, NY: Scribner.

Sanderson, S.W. and Uzumeri, M. (1997) *Managing Product Families*, Chicago, IL: Irwin.

Shirley, G.V. (1990) 'Models for managing the redesign and manufacture of product sets', *Journal of Manufacturing and Operations Management*, Vol. 3, No. 2, pp.85–104.

Da Silveira, G., Borenstein, D. and Fogliatto, F.S. (2001) 'Mass customization: literature review and research directions', *International Journal of Production Economics*, Vol. 72, No. 1, pp.1–13.

Simpson, T.W (2005) 'Product platform design and customization: status and promise', Special issue on *Platform Product Development for Mass Customization, AIEDAM*, Vol. 18, No. 1.

Soininen, T. and Stumptner, M. (2003) Special issue on 'Configuration', *AIEDAM*, Vol. 17, No. 2.

Suzue, T. and Kohdate, A. (1988) *Variety Reduction Program: A Production Strategy for Product Diversification*, Cambridge, MA: Productivity Press.

Ulrich, K. (1995) 'The role of product architecture in the manufacturing firm', *Research Policy*, Vol. 24, No. 3, pp.419–440.

Wheelwright, S.C. and Clark, K.B. (1992) 'Creating project plans to focus product development', *Harvard Business Review*, Vol. 70, No. 2, pp.70–82.

Wheelwright, S.C. and Clark, K.B. (1995) *Leading Product Development*, New York, NY: Free Press.

Whitney, D.E. (1993) 'Nippondenso Co. Ltd: a case study of strategic product design', *Research in Engineering Design*, Vol. 5, No. 1, pp.1–20.

Zipkin, P. (2001) 'The limits of mass customization', *Sloan Management Review*, Vol. 42, No. 3, pp.81–87.