

# *Crafting competitive advantage: crafts knowledge as a strategic resource*

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*This paper describes how, through its alliances with crafts-based designers, a UK pewter manufacturer has transformed its learning capabilities, adding value to its products and creating new organizational knowledge. Drawing on literature from the fields of design management, organizational learning and crafts theory, a three part model is proposed which describes the contribution of crafts knowledge and cognition in this process, as a means of stimulating innovation, of integrating expertise, and of disseminating and stabilizing learning. The impact of organizational structure upon project success is analyzed, and the company's strategic and competitive gain described and evaluated. It is concluded that crafts knowledge may constitute a powerful strategic design tool when, as in the case described, it is managed appropriately and recognized as a unique amalgamation of cognitive, social and technical skills rather than a purely aesthetic resource. © 2001 Elsevier Science Ltd. All rights reserved.*

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**1 Press, M and Cusworth, A** *New Lives in the Making: The Value of Craft Education in the Information Age* Crafts Council/Sheffield Hallam University Art and Design Research Centre (1998)

**2 Thackara, J** (ed.) *New British Design*, Thames and Hudson, London (1986)

**3 Levien, R** 'The importance of craft to design for industry' *RSA Journal* Vol 2 No 4 (1998) 89–95

**4 Dormer, P** *The Art of the Maker* Thames and Hudson, London (1988)

This paper contributes to the literatures of both design theory and organizational learning by investigating the nature of new product development (NPD) undertaken in collaboration between craft makers and manufacturers. In relation to design theory, it applies the notion of craft as 'intelligent making', or a synthesis of cognitive style, skills, knowledge and experience<sup>1</sup> to understanding the relationship between crafts-based designers and manufacturers. This marks a departure from existing literature, which limits its view of crafts knowledge to technical skill and stylistic awareness. In these accounts, collaboration is advocated as a means of enlivening 'bland' mass produced goods<sup>2</sup> and of imbuing them with richness, subtlety and attention to detail<sup>3,4,5</sup>. Crafts-based design-



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ers are valued as sources of a marketable handmade aesthetic<sup>6</sup> as materials technicians<sup>5</sup> and as model-makers capable of aiding product visualization<sup>7,8</sup>.

Empirical evidence suggests that this limited perspective is common amongst manufacturers as well as theorists, and can be detrimental to project outcome: NPD is often sequential rather than truly collaborative, with an emphasis on reproducing pre-specified, crafts-derived designs. By evaluating an example of crafts-manufacturing collaboration informed by the notion of craft as 'intelligent making', the paper therefore aims to elicit a more rounded understanding of its potential than that documented in existing literature.

In relation to organizational learning theory, the paper addresses the perceived lack of case studies demonstrating pragmatic solutions to the problems of actually devising and implementing organizational learning strategies<sup>9</sup>. This disparity between theory and practice may be considered a cause for concern, when organizational learning, defined as the process by which a company expands its potential<sup>10</sup>, is considered crucial in creating the responsiveness required in order to maintain competitiveness in changing markets<sup>11</sup>. It is exacerbated by the current debate on competitiveness, which acknowledges the generation and application of knowledge as essential to economic growth, as expressed in a recent UK government white paper.

British business must compete by exploiting capabilities which its competitors cannot easily match or imitate. These distinctive capabilities are not raw materials, land or access to cheap labour. They must be knowledge, skills and creativity, which help create high productivity business processes and high value goods and services.<sup>12</sup>

The paper will first introduce the manufacturer, its background, culture and context for new product development. It will then describe its first attempts at collaboration and the difficulties resulting from its impromptu approach to project management. The new organizational structure developed in response to these problems will then be described, and the new applications for crafts knowledge which it enabled analysed. The impact of project management, resources, culture and strategy will be evaluated, actual outcomes and commercial impact assessed. and conclusions drawn.

## *I Methodology*

Case study analysis was conducted through a series of semi-structured interviews held with the manufacturer's product development manager and sales director, and with collaborating crafts-based designers. Additional

**5 Goodison, N** 'The crafts and their industrial future' *RSA Journal* Vol 1 No 4 (1998) 100-108

**6 Clark, P** (head of design, DemaGlass Tableware) interview with the author (1997)

**7 Hughes, L** 'Industrial evolution' *Crafts* Nov-Dec (1994) pp 21-25

**8 Woodhuysen, J** 'Small firms, big firms and the future of the crafts' *RSA Journal* CXLIV(5471) (1996) 74-79

**9 Edmondson, A and Moingeon, B** 'When to learn how and when to learn why: appropriate organizational learning processes as a source of competitive advantage' in **A Edmondson and B Moingeon** (eds) *Organizational Learning and Competitive Advantage* Sage, London (1996)

**10 Huber, G P** 'Organizational learning: the contributing processes and the literature' *Organizational Science* Vol 2(1) (1991) cited in **Edmondson A and Moingeon B** 'When to learn how and when to learn why: appropriate organizational learning processes as a source of competitive advantage' in **B Moingeon and A Edmondson** *Organizational Learning and Competitive Advantage* Sage, London (1996)

**11 Garvin, D A** 'Building a learning organization' *Harvard Business Review* (1993) pp 78-91 cited in **A DiBella, E C Nevis EC and J M Gould** 'Organizational learning style as a core capability' in **B Moingeon and A Edmondson** *Organizational Learning and Competitive Advantage* Sage, London (1996)

**12 Our Competitive Future: Building the Knowledge Driven Economy** DTI (Department of Trade and Industry, Stationery Office) London (1998)

information was gained from analysis of company accounts, informal conversations held with production staff and company managers, and observation of work in progress. Rigour was maintained through a relativist approach which sought to preserve the case's multiple perspectives, and through triangulation aided by additional interviews with peripheral participants, including a rival pewter manufacturer simultaneously involved in collaboration with one of the designers interviewed.

## *2 Company background*

A.R.Wentworth Ltd was established in Sheffield in 1949, and employs around 50 production staff. Manufacturing centres on traditional giftware (Figure 1), whose familiarity and inherent suitability for existing technology ensure high levels of production efficiency. These products are sold at trade fairs, in quantities of up to 2000 units. Until recently, new products were typically designed by company managers, who often reconfigured existing moulds in order to ensure continuing efficiency through appropriateness to established methods. The company also accepts designs from clients including retailers and advertising agencies, who typically present a non-negotiable brief with specifications poorly suited to available materials and processes. This creates manufacturing problems which engender resentment and resistance to change amongst production staff.

Although pewter manufacture in the UK is semi-automated, certain processes remain dependent upon the crafts skills gained through apprenticeship and improved incrementally through experience. Production workers' tacit knowledge can therefore constitute a core organizational competence. The high levels of craft skill evident at Wentworth, together with the company's low tooling costs and flexible manufacturing schedules, would appear to be a source of considerable competitive advantage in an economy



*Figure 1 Standard  
Wentworth tankards*



Figure 2 Metalsmith

prioritizing customization, service and just-in-time delivery. In an industry competing increasingly on cost in a diminishing market for traditional giftware, the company would appear ideally suited to repositioning itself as a supplier of higher quality, more contemporary products than those of its competitors.

The company recognizes, however, that its success in strategically aligning existing resources with a changing environment has been impeded by a resistance to change which impedes organizational learning. Such inertia is acknowledged as common in companies facing environmental threat, where the need for change typically provokes either workforce complacency or an increasingly rigid conformity to established practice<sup>13</sup>. In this instance, it is exacerbated by a system of productivity-related pay which prioritizes output, and favours existing procedures and products. For production staff, introducing new products results in a reduction in productivity and a subsequent loss of earnings. A resulting culture of efficiency is reinforced by a high level of job specialization, which may restrict individual competence to a particular technique. As the company's product development manager explains,

Most of them started at fourteen or fifteen, trained as metalsmiths, spinners, buffers, or polishers, and that's all they know how to do. They look at a piece and say "I can't do it", because they've done the same tankard for thirty years.

It may be summarized that whilst the company is eager to embrace emerging markets and a demand for smaller orders of higher quality, reliable products, its production management systems and culture continue to emphasize efficiency and uniformity (Figures 2 and 3).

**13** Tushman, M and Nadler, D 'Organizing for innovation' in S Hart (ed) *New Product Development: A Reader* The Dryden Press, London (1996)



Figure 3 Buffer

### 3 Initial alliances

In 1989, Wentworth accepted the first of many commissions from crafts-based designers, seeking to expand production capacities through collaboration with a manufacturer.

These designers were discovered to differ fundamentally from other clients in their approach to NPD. Perhaps because of the interdependency of process and intent inherent to crafts practice<sup>14,15,16,17</sup>, greater appreciation was evident of the need for congruence between product specifications and manufacturing resources. In contrast to other clients' inflexibility and detachment, crafts-based designers tended to actively seek local knowledge with which to inform design development.

Such an integrated approach to design and making had clear potential to overcome the problems usually encountered in manufacturing designs specified without understanding of manufacturing materials and processes. However, early projects proved problematic as, with guidance from neither the company nor previous experience, designers tended to misjudge appropriate levels of communication with production staff. When insufficient communication occurred between designer and production staff, the usual problems of inconsistency between specifications and capabilities persisted. Conversely, excessive demands for contact with production staff constituted a distraction from standard production, engendering resentment despite the resulting designs' improved suitability for manufacture. The product development manager describes such a situation:

You'd wander round and he'd *be* there and he'd been there all morning, badgering one of the guys. He'd literally draw on the walls. He was there on the guy's shoulder saying "can you put a bit more curve in there? Can you straighten that bit up?" or whatever.

**14 Dormer, P and Thackara, J** 'Design and the age of quality' *Design* 427(July) (1984) 85

**15 McCullough** *Abstracting Craft: The Practiced Digital Hand* MIT Press, Cambridge, MA (1996)

**16 Johnson, P** 'Naming of parts' *Craft* May-Jun (1995) 42-45

**17 Butcher, M** 'Personal practice and the expression of theoretical principles in traditional and modern basketmaking' in **P Johnson** (ed.) *Ideas in the Making* Crafts Council, London (1998) p 51

Without management or structure, project success was largely dependent upon the individual designer's experience, flexibility and interpersonal skills, with each negative experience reinforcing production staff antagonism and unwillingness to co-operate. Resentment of interruption meant that requests for co-operation would receive the response, 'not paid to talk', and that new products were on occasion sabotaged, either by the production team's unwillingness to co-operate, or by manufacturing schedules which prioritized standard orders. Together with the short-term gain afforded by standard production and the lack of formal advocacy for product development activities, crafts-based designers' requirements and concerns were frequently neglected.

#### 4 *Developments in approach*

In late 1996, Wentworth began an informal process of self-evaluation, assessing its strengths and weaknesses, its resources and competencies, and its position in relation to competitors. This revealed that whilst profitability in the company's traditional markets was decreasing, alliances with independent designers were now generating almost one quarter of annual turnover. Alliances with crafts-based designers were therefore seen as a means of increasing profitability by targeting markets competing on quality and uniqueness rather than cost. As the company's managing director states,

Our belief is that this type of work has got to be the future. These products can command a better price because they are articles of quality and because they have a higher perceived value in the market-place. With a tankard, you can make the best tankard in the world and it's still just a tankard, just a commodity.

It was recognized that the success of such a repositioning could be threatened by the inertia induced by the company's workforce culture. This is a problem widely documented by management theorists, with a resistance to change being frequently encountered by designers engaging in cross-functional collaboration<sup>18,19</sup> and cultural differences often impeding alliances requiring an integration of diverse knowledge and skills<sup>20</sup>. Remedial measures are also well documented, and were unconsciously adopted by Wentworth in response to its self-evaluation. For example, its appointment of a product development manager installed a project champion<sup>21</sup> capable of undertaking boundary-spanning roles<sup>22</sup> both within the company and in its external alliances. Adopting the role of 'sponser'<sup>22</sup> this individual could secure acceptance and support for product development, whilst maintaining congruence between project goals and company strategy. In this way, resistance to development activity could be reduced, and priorities shifted. Undertaking the role of 'environmental scanner'<sup>22</sup> the product development manager could source expertise from outside the company in response to specific design problems, thereby increasing the

**18 Jordan, K** 'The human factor: obstacles to change' *Design Management Journal* Fall (1997) 40–46

**19 Burnside, R M** 'Improving climates for creativity' in **M A West and J L Farr** *Innovation and Creativity of Work* John Wiley and Sons, Chichester, UK (1990) cited in **Cooper, R and Press, M** *The Design Agenda* John Wiley and Sons, Chichester, UK (1995)

**20 Nanda, A** 'Resources, capabilities and competencies' in **B Moingeon and A Edmondson** (eds) *Organizational Learning and Competitive Advantage* Sage, London (1996)

**21 Moss Kanter, R** 'Change-master skills: what it takes to be creative' in **J Henry and D Walker** (eds) *Managing Innovation* Open University Press, London (1991)

**22 Sonnenwald, D H** 'Communication roles that support collaboration during the design process' *Design Studies* 17(3) (1996) 277–301

organizational capabilities which he refers to as ‘our arsenal of skills’. In the role of ‘agent’, he could facilitate interaction between project team members whilst introducing a generalist perspective when necessary. In addition, by providing a point of contact and an unusually high standard of customer service, the type of on-going client relationships widely accepted as a productive form of design alliance<sup>23,24</sup> could be nurtured.

In each of these activities, the product development manager displayed skills considered essential in championing innovation<sup>21</sup>: tenacity, experience-based problem solving capabilities, skill in communicating vision and motivating others, and an active participation in and commitment to each project. His attitude to management is evident in his comments that,

I always think of them as *my* products, my customers, my designers.

Further parallels exist between management theory and Wentworth’s new NPD strategy in the company’s development of an autonomous and task-oriented project team. This team, which formed the sole point of contact for designers, consisted of the product development manager and certain key production staff, mostly self-appointed, and all highly skilled and motivated by challenge. When required, this team was isolated from production line activity and exempted from productivity-related pay. By allowing product proposals to be refined before their introduction to the production line, it avoided the problems encountered when discrepancies between design and manufacturing capabilities occurred.

This adoption of a differentiated organizational structure capable of accommodating varied goals, time-scales and working practices between departments parallels methods advocated for adapting to changing markets and technologies<sup>25</sup>. Comparison with existing models of organizations as learning systems<sup>26</sup> clarifies how Wentworth’s new approach effectively transformed its learning capabilities, establishing an environment where attitudes and working practices appropriate for innovation work could temporarily exist alongside those required to maintain uniformity and efficiency in standard production.

For example, exemption from productivity-related pay meant that evaluation criteria appropriate to the project could be applied, transferring emphasis from output to learning and problem solving. Whereas problems created by new designs would previously have been considered intolerable, in this context creative conflict could be valued as the chaotic yet essential aspect of innovation described by theorists<sup>13</sup>. Similarly, whereas crafts-based designers’ unfamiliarity with manufacturing technology would pre-

**23** Jevnaker, B ‘Absorbing or creating design ability’ in **M Bruce and B Jevnaker** (eds) *Management of Design Alliances: Sustaining Competitive Advantage* John Wiley, Chichester, UK (1998)

**24** O’Connor, W J ‘Consultants and clients: relationships, branding and the new rules of engagement’ *Design Management Journal* 7(2) (1996) 71–75

**25** Handy, C *Understanding Organizations* 4th ed Penguin Books, London (1993)

**26** DiBella, A, Nevis, E C and Gould, J M ‘Organizational learning style as a core capability’ in **B Moingeon and A Edmondson** (eds) *Organizational Learning and Competitive Advantage* Sage, London (1996)

viously have been derided by production staff, it could now be exploited as a means of challenging assumptions and, when combined with relevant expertise, to implement the apparently impossible<sup>27</sup>. Within the project team, a climate of experimentation and openness contrary to that of the production line could be cultivated<sup>25,26</sup> and initiatives originating from any hierarchical strata encouraged<sup>26</sup>.

It is evident that the managerial-level commitment to product development signified by investment in technological and human resources has influenced attitudes throughout the workforce. Together with the establishment of a project team, this has led to the development of a systems perspective<sup>26</sup> whereby the dynamic and interdependent nature of production line and project team activities could be acknowledged and more effectively managed. This is illustrated by the product development manager's description of his relationship with production managers:

It's different at this time of year because I've been told, you know, no product development for six months because we're just too busy, which is fair enough as long as I know that. But at the same time I can go to our production manager and say look, it's building up again, I really need Sean (project team member), just to clear the backlogue. Whereas before it was just a case of, "sorry, go away, we're not taking anything on while February", so it was just stupid.

## *5 New potential for crafts knowledge*

Wentworth's new approach to product development succeeded in overcoming the problems encountered in its initial collaborations with crafts-based designers. However, it also unexpectedly revealed new and significant potential for crafts knowledge as a strategic resource across the NPD cycle, in stimulating innovation, in integrating knowledge, and in disseminating and stabilizing learning (see Figure 4).

### *5.1 Stimulating innovation*

Products proposed by crafts-based designers are typically clearly defined in terms of aesthetic qualities, yet flexible concerning precise techniques and forms. Because the making process is inseparable from creativity in crafts practice, negotiation between such apparently conflicting variables is not only accepted, but valued as a catalyst to creativity<sup>16,17</sup>.

Given conditions appropriate for innovation, this crafts-based cognition now revealed unexpected potential as a communications tool, enabling a two-way negotiative dialogue to be established between crafts-based designer and project team member. This dialogue acted as a stimulus to innovation, challenging assumptions and indicating discrepancies between

**27 Sebell, M and Goldsmith, C** 'Dodging roadblocks on the innovation highway' *Design Management Journal* Fall (1997) 34-39



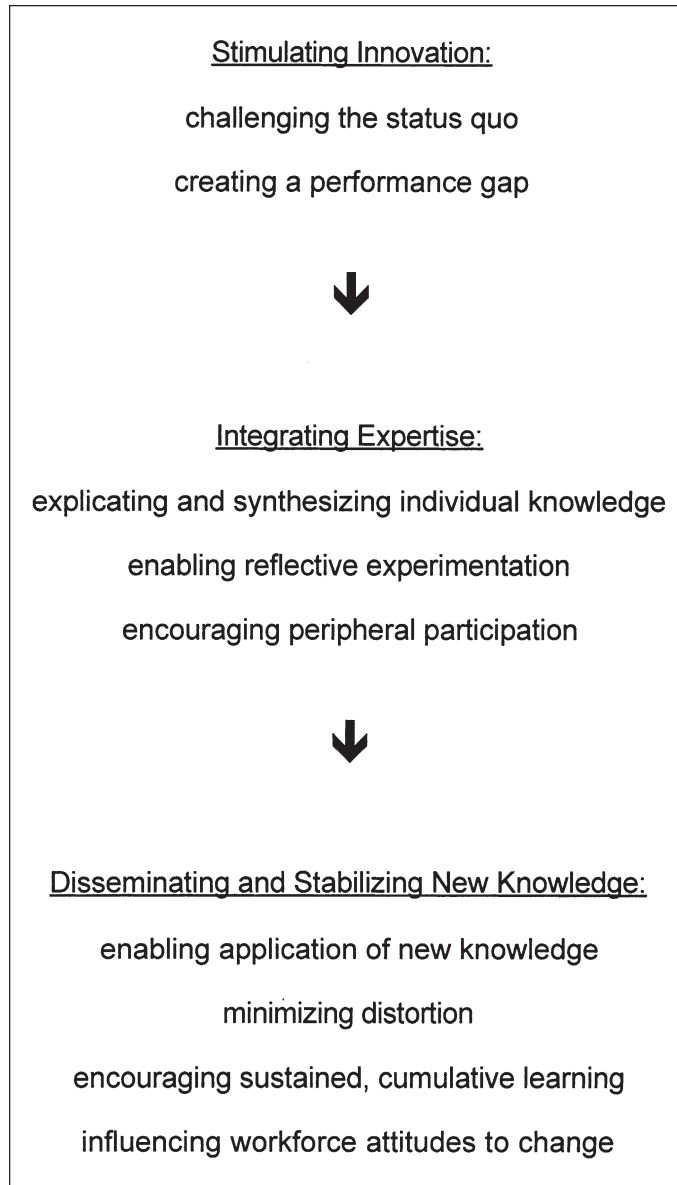


Figure 4 Crafts knowledge as a catalyst to organizational learning

manufacturing potential and existing capabilities. Wentworth's product development manager explains the benefits of introducing a new perspective, enabled by the crafts-based dialogue:

What these guys (crafts-based designers) give us is the fact that they turn round and say, "yes you can do this. Because I'm not trained as long as you have been, I haven't been trained in just one side of working metal like you are, look, I can produce this".

Creative conflict such as this stimulates learning by identifying ‘performance gaps’ to be bridged<sup>26</sup>. However, it is easily eradicated when the need for ease of manufacture encourages design within existing capabilities. At Wentworth, collaboration involving the manipulation of actual processes and materials of manufacture results in a gradual assimilation of new knowledge by the crafts-based designer, establishing industrial methods as a creative tool rather than a constraint. In this way, the apparently contradictory aims of maintaining creative conflict whilst improving appropriateness for manufacture may co-exist. As one crafts-based designer explains,

We pushed them to get more adventurous in what they’d try out, and at the same time they gave us technical stuff like they have to be this thick for the pewter to run through the gap, or they can’t be too thin or too thick or too heavy, else you get all the porosity. So the second time round they were much better, it was a lot easier to get the new products through.

## 5.2 *Integrating knowledge*

Having created the impetus for innovation, the crafts-based dialogue was instrumental in formulating product solutions which resolved problems by synthesizing knowledge, whilst accommodating the objectives of both designer and production staff. It allowed designs to be redefined as appropriate and cost-effective for manufacture, whilst maintaining the particular aesthetic and tactile qualities characterizing the original product concepts.

By employing a crafts-based dialogue, innovation was encouraged to occur at the interface between crafts-based designer and key production staff. The dynamic relationship between process and intent could be explored collaboratively, through a dialogue centred on the object and articulated through parallel verbal articulation and practical demonstration. This process of two-way negotiation is illustrated by a crafts-based designer’s account of her work with the project unit:

If we’re coming up with something new then they’ll say, “could you maybe change this a bit and that’ll make it easier here. Wiggle this little bit *here* and make it a bit thicker *here*.”

Somebody will say “I can’t join this to this”, and maybe the subtleness of saying “hmm, well have you thought of maybe doing this and this?” and they’ll say “hmm, good idea” or “hmm, but ah then there’s x that can be brought in”, and that will achieve the same final effect.

Synthesizing knowledge in this way has resulted in technological innovation, for example the pioneering of a technique involving encasing fibreboard blocks in pewter sheet which expands the vocabulary of shapes

available in the material. It has also found product applications for existing technology, for example the employment of a recognized yet unused technique of embedding pewter with steel in strengthening a wine bottle stopper and thereby improving its function. As the company's product development manager explains,

There's so much redundant, or seemingly redundant, equipment in the factory, that we can use again, because whilst it was used for one product twenty years ago and hasn't been used since, it's still relevant.

Further benefits have resulted from the crafts-based dialogue in terms of problem-solving, for example initiating external alliances in order to resolve problems beyond its own capabilities. Particularly strong potential competitive advantage has resulted when such an alliance has complemented technological innovation, as in the case of the pewter wrapping technique, which benefitted from an association with a fibreboard manufacturer. In addition, interaction has encouraged production staff to develop their own product ideas. Finally, communication through craft has identified new applications for crafts-based designers' knowledge of allied specialisms such as tool making and market awareness.

It is apparent that, through its communal language<sup>4</sup> the crafts-based dialogue transcended barriers created by functional specialism and culture, enabling heterogeneous individual knowledge to be explicated and synthesized. It has been asserted that because crafts cognition resides in physical processes centred on manipulation, it cannot be articulated fully in words<sup>4</sup>. In a wider context, it has been suggested that practical knowledge is inextricable from both the experience of practice<sup>28</sup> and the context to which it is applied<sup>29</sup>. This suggests that when, as here, the project team incorporates specialists with radically different skills and knowledge yet sharing crafts knowledge, such dialogue constitutes the most effective means of integrating expertise.

The crafts-based dialogue contributed further to the integration of expertise through its continual embodiment of project progression, in the form of tests, concept models and prototypes. It is recognized that visual means of communication can improve cross-functional integration in product development<sup>30</sup>, and that in this respect three-dimensional models constitute a highly effective tool. Peters and Waterman<sup>31</sup> recommend the use of three-dimensional objects as a means of encouraging 'reflective experimentation':

The richness of the experience...that occurs solely when one is exposed tangibly to a subject, material or process is unmatched in the abstract, via paper analysis or

**28 Polanyi, M** *Personal Knowledge: Towards a Post-critical Philosophy* University of Chicago Press, Chicago, USA (1962) cited in **Spender, J C** 'Competitive advantage from tacit knowledge' in **B Moingeon and A Edmondson** *Organizational Learning and Competitive Advantage* Sage, London (1996)  
**29 Vygotsky, L S** *Thought and Language* Massachusetts Institute of Technology Press, Cambridge, MA (1962) cited in **Spender, J C** 'Competitive advantage from tacit knowledge' in **B Moingeon and A Edmondson** *Organizational Learning and Competitive Advantage* Sage, London (1996)  
**30 Leonard-Barton, D** 'Inanimate integrators: a block of wood speaks' *Design Management Journal* Summer (1991) 61–67  
**31 Peters, T and Waterman, R** *In Search of Excellence: Lessons from America's Best Loved Companies* Harper Collins, London (1995)

description...it is much easier for people to think creatively about a product...if a prototype, which is to say a low level of abstraction, is on hand.

At Wentworth, the manifestation of design progression in tangible form released it from participants' personal knowledge, providing accessibility to others throughout the company. This both encouraged the informal comment defined as 'legitimate peripheral participation'<sup>32</sup>, and contributed to a culture conducive to innovation. By embodying progression, active management participation was encouraged<sup>26</sup> alongside the climate of experimentation acknowledged as common to innovative companies<sup>31</sup>. This is substantiated by one crafts-based designer, who states that,

They're open-minded and creative, they're willing to try out ideas and different ways that they've never thought of using before. They'll give it a go and see if it works....And they *will* solve the problem.

Moreover, in manifesting mistakes as well as progress, the process legitimized failure, fostering a climate of openness considered important in facilitating organizational learning<sup>26</sup>, and again encouraging input from throughout the company.

Products embodying an integration of diverse expertise are increasingly recognized as a source of competitive advantage, due to their uniqueness and subsequent insusceptibility to imitation<sup>12,33,34</sup>. Particularly strong competitive advantage may be accrued when, as here, companies or individuals with increasing knowledge-based resources combine their new, heterogeneous areas of expertise<sup>35</sup>. The organization's ability to foster creative interaction between designers and key staff is considered essential in managing such integration<sup>23</sup> yet notoriously difficult to attain<sup>20</sup>. This case demonstrates how such amalgamation of knowledge may be facilitated through the employment of a crafts-based dialogue.

### 5.3 Disseminating and stabilizing new knowledge

The effective dissemination and institutionalization of new tacit knowledge is recognized as crucial to the development of the learning organization, yet inherently problematic<sup>9,36</sup>. The incommunicability of such knowledge constitutes a potentially powerful source of competitive advantage, as its resistance to verbal encoding impedes imitation by competitors. Paradoxically however, such incommunicability is equally capable of restricting the transfer of new knowledge within the organization, preventing its actual implementation to core activities<sup>12</sup>. As Collis states<sup>37</sup>,

Whatever is learned, wherever it is learned, must be transferred to other appropriate personnel and institutionalized if the organization as a whole is to continually improve its performance.

**32 Lave, J and Wenger, E** *Situated Learning: Legitimate Peripheral Participation* Cambridge University Press, Cambridge (1991) cited in **DiBella, A, Nevis, E C and Gould, J M** 'Organizational learning style as a core capability' in **Moingeon and A Edmondson** *Organizational Learning and Competitive Advantage* Sage, London (1996)  
**33 Rhodes, E and Carter, R** 'Emerging corporate strategies: teams and the changing role of design' *Co-Design* 3 (1995) 6–13  
**34 Ruekert, R W** 'Cross functional interactions in product development and their impact on project performance' *Design Management Journal* 6(3) (1995) 50–54  
**35 Leadbetter, C** 'Surf the British brainwave' *The Observer* (13.12.1998) p 18  
**36 Spender, J C** 'Competitive advantage from tacit knowledge' in **Moingeon and A Edmondson** (eds) *Organizational Learning and Competitive Advantage* Sage, London (1996)  
**37 Collis, D** 'Organizational capability as a source of profit' in **Moingeon and A Edmondson** (eds) *Organizational Learning and Competitive Advantage* Sage, London (1996)

Such problems may be expected to be exacerbated when, as at Wentworth, product development is undertaken by project teams. The temporary and autonomous status of such teams, whilst facilitating actual innovation<sup>25,31</sup> may impede sustained learning across the organization<sup>28</sup>.

At Wentworth, crafts knowledge played a crucial role in committing the new knowledge generated through product development to the collective organizational memory. A crafts-based language similar to that occurring between crafts-based designer and project team member was employed in communications between project team member and production staff. The product development manager describes this process of concurrent demonstration, verbal articulation and imitation:

Sean and Stevie (project team members) will sit down and show the guys how they did it, demonstrate it to them, then they can have a go for a bit until they're confident, and then we'll make the thing. With Scott (trainee spinner), Sean will stand over his shoulder for a bit and say "you're doing this wrong, you're doing this right", whereas with Mick and Brian, who've been here thirty years, just a couple of illustration spinnings and they'll get it.

In this way, new knowledge could be transferred directly from project team to production staff despite its resistance to verbal or written articulation. Whereas verbally-conveyed learning is commonly stored as informal narrative<sup>36</sup> or documentation, in this case learning was encoded and stabilized in production workers' crafts knowledge.

This institutionalization of new knowledge allowed incremental improvements through use, application to the demands of new projects, recollection following a period of non-use, and conveyance to outsiders and newcomers. In addition, the directness of the crafts-based language minimized the distortion of information considered detrimental to learning on an organizational scale<sup>9</sup> through its avoidance of verbal encoding and decoding. It is evident that crafts knowledge has the potential not only to create organizational learning, but also to assist in its implementation.

The division of organizational learning into two stages, addressing knowledge generation and implementation as separate processes, was initially developed solely as a means of remedying problems encountered during the company's initial alliances. However, further and unexpected advantages have resulted from the dissemination process in terms of increased production staff competencies. According to the product development manager, the challenge and variety introduced by development activities has stimulated gradual yet significant learning amongst younger production

staff, improving both technical competence and problem-solving capabilities. In the longer term, co-operation with project team members and the application of existing skills to new products have the potential to challenge entrenched attitudes towards progress<sup>18</sup>.

## *6 Outcomes*

The key outcome from Wentworth's alliances with crafts-based designers has been the development of a product development process capable of explicating, synthesizing and exploiting previously hidden capabilities, whilst simultaneously creating, disseminating and institutionalizing new tacit knowledge. The learning stimulated by this process represents significant strategic gain, encompassing both technical and personal competencies. Because personal knowledge is unique, derived from experience and essentially incommunicable, it is considered a strong source of competitive advantage in the knowledge-based economy<sup>9</sup>. As the 1998 UK government white paper on competitiveness states,

Increasing returns to scale are more prevalent in products with a large knowledge component, offering huge potential for growth.<sup>12</sup>

Through its alliances with crafts-based designers, Wentworth has establishing competitive advantage based on the knowledge-based assets of responsiveness, flexibility and quality. In an industry characterized by inflexibility and resistance to change, these qualities represent a source of competitive advantage which is unusual and highly valuable to clients. As the company's product development manager states,

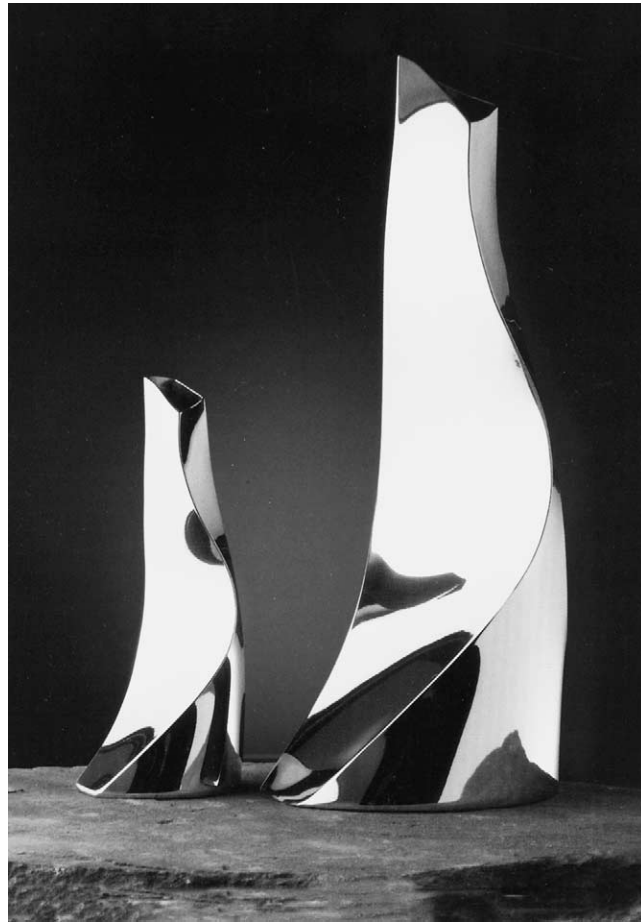
We can now tackle just about anything. There's no project or no product that scares us too much. There's no job that we'll turn away, and there's actually very few jobs that we fail on.

The effectiveness of Wentworth's new problem-solving capabilities and flexibility is illustrated by its success in adapting one crafts-based designer's entire product range, from hand made silver to machine-formed pewter. In many cases, the designs were initially considered incompatible with the materials and processes available. However, by devising new applications for existing technology and by out-sourcing certain specialist processes, manufacturing solutions were devised for ninety-nine of the one hundred proposed products. In comparison, a rival manufacturer approached by the designer failed to produce satisfactory prototypes of any of the designs.

Wentworth's new, knowledge-based capabilities had a significant impact upon its competitiveness. Company accounts show the contribution to turnover from independent designers to have risen from 1.2% in 1989 to over

25% in 1998. Crucially, new product development was affected to a lesser extent than standard production by a national downturn in productivity from 1997 to 1998. Moreover, development work has not, according to company managers, detracted from standard production, but represented an additional contribution to revenue. Potential for further growth is signified by the actual number of independent designers sub-contracting manufacture, which since the product development manager's appointment in 1996 rose from four to thirty-one. Given the company's commitment to the development of on-going alliances, a high proportion of these may be expected to develop further.

Wentworth's competitiveness as a supplier to retailers has also increased, as the new products developed by production staff, together with those purchased from certain crafts-based designers, have enabled it to assemble a contemporary product range, 'Design Gallery' (Figures 5 and 6 Fig. 6).



*Figure 5 Vases by Catherine Tutt for the 'Design Gallery' range*

Figure 6 Paper cutters by Alan Pickersgill for the 'Design Gallery' range



This range not only repositions the company in more lucrative and sustainable markets than those served by its traditional giftware ranges, but also demonstrates its increasing technical capabilities to retailers. As the product development manager explains,

People come and say, I can't believe you can do that. I want something a little bit more mundane, but as you guys are capable of doing that, you're bound to be capable of doing what I want.

The contribution to turnover made by these products doubled between 1994 and 1997, reflecting the high profit margins that their knowledge component could command. In effect, collaboration has initiated a shift in the company's core competence, from commodities to knowledge-based resources, enabling the company to attract new clients who demand standards of quality and service unusual in the pewter industry. Together, increasing subcontract work, orders for own ranges and exclusive commissions resulted in a 15% increase in turnover during 1998, comparing favourably with an estimated 30% general downturn in productivity across the industry.

## 7 Conclusions

By linking empirical research with selective literature sampling, this paper has enabled assertions to be made with significant implications for future crafts-industry collaborations.

Firstly, strategic applications for crafts knowledge within collaborative new



product development have been identified and defined as a three part model, centred on the catalyzing of creativity, integrating of expertise, and transfer and stabilization of new knowledge. The potential has been demonstrated for such knowledge to create new skills and learning capabilities, generating knowledge-based competencies, and products which derive competitiveness from their uniqueness and inimitability.

Secondly, the importance to such learning has been identified of a negotiative, crafts-based dialogue, involving a process of concurrent demonstration, imitation and articulation which enables the conveying of ideas directly through the manipulation of materials and objects. Through this dialogue, innovation is encouraged to occur at the interface between design and manufacturing, allowing creative conflict to be maintained, functional objectives to be upheld and solutions developed from a unique configuration of expertise. In essence, the crafts-based dialogue creates the impetus for innovation, provides a means of achieving it, and optimizes its potential by facilitating dissemination and institutionalization.

Thirdly, the need for congruency between organizational strategy, structure and resources has been demonstrated, if crafts knowledge is to fulfil its strategic potential. It appears that the dialogue identified as crucial in the stimulation of organizational learning cannot be established within a culture where priorities for efficiency impede creative experimentation. In this instance, the establishment of conditions appropriate for innovation proved crucial to success, both in the fulfillment of existing objectives and in the identification of further strategic potential. The implications for similar companies in the crafts-based industries are significant, given their apparent similarities in terms of workforce resistance to change and its negative effect on strategy implementation.

Finally, connections have been made between theory and practice, whose generalizability may now be evaluated. The company's success may be attributed to its resource-based approach<sup>20</sup> to strategy development. Its chosen approach to repositioning itself should not therefore necessarily be adopted by other companies, but adapted or replaced in accordance with their particular circumstances.

This assertion does not, however, preclude generalization from the case, as the problems, market demands and potential strengths it elicits appear common to many materials-based manufacturers. The establishment of an autonomous, highly motivated and task-oriented project team, overseen by a manager with boundary-spanning and advocacy capabilities, may therefore be considered a model which, with appropriate adaption to circum-

stances, has potentially broad applications in overcoming resistance to change in the crafts-based industries. Combined with recognition of crafts knowledge as a synthesis of cognitive, social, technical and aesthetic skills, crafts-industry collaboration has the potential to transform skill-oriented manufacturing companies into learning organizations, which derive new competitiveness from knowledge-based capabilities.