

*Strand 1: Art Nouveau Cities: between cosmopolitanism and local tradition*

Chicago as an Art Nouveau City  
Janet L. Whitmore

In 1870 the city of Chicago, Illinois was thriving, and expanding its role as the commercial hub of the American midwest with remarkable speed. The city attracted an ever increasing number of immigrants, tripling in size from 1850 to 1860, and again from 1860 to 1870 when the population reached 298,977.<sup>1</sup> As the center of a massive railway network, Chicago dominated not only its immediate region, but also controlled the rail connections between all east and west coast cities in the United States. In fact, an 1870 advertising poster created by the Chicago, Rock Island and Pacific Railroad proclaimed that travelers could journey “Around the World” via the railway and its associated steamship routes, starting and ending in Chicago.<sup>2</sup> In the midst of this dramatic growth, city leaders were eager to develop an architecture that reflected both their economic success and their cultural aspirations. By the late 1860s, after the end of the Civil War (1860-65), Chicago businessmen invested heavily in new stores, hotels and homes. “Hotels already large enough to accommodate small armies were made larger and vastly more ornate; and many more of them appeared beside the new five-and six-story brick-and-marble-faced business buildings downtown.”<sup>3</sup> The expansion was impressive, but the design quality of these new structures was less noteworthy. Noah

---

<sup>1</sup> Population statistics were compiled by the University of Illinois-Chicago under the auspices of the Chicago Imagebase project, which utilizes a variety of historical sources, including land use surveys and City of Chicago annexation maps. For a detailed description of population growth and maps illustrating changes over time, see:

<http://tigger.uic.edu/depts/ahaa/imagebase/chimaps/>. Consulted 30 April 2013.

<sup>2</sup> The Around the World advertising poster is in the collection of the Chicago Historical Society (ICHI-314861) and can be viewed on their website at:

<http://www.encyclopedia.chicagohistory.org/pages/11617.html>. Consulted 30 April 2013. For a further discussion of Chicago’s role as the financial heart of the American midwest and its role as a gateway city, see William Cronon, *Nature’s Metropolis, Chicago and the Great West*, New York and London: W. W. Norton & Company, 1991.

<sup>3</sup> Donald L. Miller, *City of the Century, The Epic of Chicago and the Making of America*, New York: Simon & Schuster, 1996, p. 132.

Brooks, a Washington, D.C. war correspondent, traveled to Chicago in 1864 and later filed a report on the city's exuberant built environment, noting that "Architecture appears to run riot here among all the ancient schools of design, which have been pillaged to decorate the piles of carved, fluted, and pillared stone piles which rise on every hand."<sup>4</sup> This unfortunate *mélange* of styles reflected the scarcity of trained architects in the city at the time, as well as the preferences of business leaders for European design vocabularies that were perceived as distinguished.

However, all of this was moot by the close of 1871. The city had burned for three days in early October of that year, and the entire central business district as well as most residential neighborhoods were destroyed, with 100,000 people left homeless in the immediate aftermath of the fire.<sup>5</sup> (Fig. 1) As horrific as this event was, it allowed the city to reassess its goals and to chart a new course for its development. First and foremost was the writing of a new building code with a specific section on fire prevention: no wooden structures would be allowed in the central business district, and all cast iron structural systems would be encased in either brick or clay tiles. Second, the charge that had been issued by civic leader Isaac Arnold at the founding of the Chicago Historical Society in 1868 became a serious consideration as the city began to rebuild: "We have boasted long enough of our grain elevators, our railroads, our trade in wheat and lumber, our business palaces; let us now have libraries, galleries of art, scientific museums, noble architecture and public parks...and a local literature."<sup>6</sup> Arnold's

---

<sup>4</sup> P. J. Staudenraus, ed. "The Empire City of the West": A View of Chicago in 1864", *Journal of the Illinois State Historical Society*, Vol. 56, No. 2, Civil War Centennial (Summer, 1963), p.340-349.

<sup>5</sup> The subject of the Chicago fire has been exhaustively researched. For a detailed discussion online, please see the Chicago History Museum's online exhibition entitled *The Great Chicago Fire*; it incorporates a wide range of archival materials, including personal memoirs, newspaper reports and journal articles as well as images from the time. <http://greatchicagofire.org/great-chicago-fire> Consulted 30 April 2013.

<sup>6</sup> Donald L. Miller, *City of the Century, The Epic of Chicago and the Making of America*, New York: Simon & Schuster, 1996, p. 170. Isaac Arnold was a Chicago attorney who served in the U.S. House of Representatives from 1860-64, and later wrote two biographies of Abraham Lincoln, *The History of Abraham Lincoln and the Overthrow of Slavery*, published in 1867; and *The Life of Lincoln*, published in 1884. Arnold was a founding member of the Chicago History Society.

directive found willing ears among Chicago's wealthiest citizens, in part because the desire for a new architecture was integral to the rebuilding of the city.

Chicago's ruin also provided abundant opportunities for anyone interested in the reconstruction efforts, including architect/engineer William LeBaron Jenney (1832-1907). Jenney's professional education at the *École Centrale des Arts et Manufactures* in Paris, and his subsequent service as an engineer in the Union Army during the Civil War, meant that he was particularly well qualified to address the complex issues involved in rebuilding the city after the fire; and as a resident of Chicago since 1867, he had already established a reputation as one of the city's leading architects. When local dry goods merchant, Levi Leiter, approached Jenney about designing a new building in the mid-1870s, the architect responded by proposing a radically new structural system that would support the building without requiring massive bearing walls; and thus allowing the inclusion of expansive windows that would showcase the merchandise for sale inside the store. By 1879, the First Leiter Building was open to the public, and the building type now known as a skyscraper was on its way to being born. Although Jenney is credited with being the "father of the skyscraper", he also deserves recognition for educating the next generation of young designers who worked in his office during the 1870s and 1880s. This included Louis Sullivan, Daniel Burnham, Martin Roche and William Holabird, all of whom would contribute significantly to rebuilding Chicago on principles that reflected new ideas about architectural design without historical references, the use of contemporary technology, the importance of nature as a source of inspiration, and being of one's own time--in short, foundational principles of art nouveau.

Louis Sullivan (1856-1924) was at the heart of this movement towards a new approach to architecture. When he arrived in Chicago in 1879, after studying at the *École des Beaux-Arts*, traveling in Europe, and learning the fundamentals of architectural practice in Frank Furness's firm in Philadelphia, he had already formed a clear idea of what kind of design he wanted to produce. Although his earlier experiences engendered a deep appreciation of European architectural traditions, Sullivan observed that in spite of its brilliance, the *École des Beaux-Arts* "in the perfect flower of

technique, lacked the profound animus of a primal inspiration.”<sup>7</sup> His return to the US and his immersion in the dynamic world of post-fire Chicago would reconnect him with the inspiration and innovation that he sought. He began working for architect Dankmar Adler (1844-1900), and became a full partner in 1883, when the firm was renamed Adler and Sullivan. During these years, Sullivan also met a number of like-minded designers who shared his belief in the possibility of creating a new American architecture; together with Adler and Sullivan, the architectural partnerships of Burnham and Root as well as Holabird and Roche were largely responsible for the transformation of Chicago into a modern city.<sup>8</sup>

Faced with a “clean slate on the prairie” after the fire, this cohort of young architects understood that they had an opportunity to create a new vision of urban life, one that would embrace the benefits of emerging technology within the parameters of economic reality in Chicago. The design reform ideas articulated by William Morris in Great Britain formed a conceptual foundation for the Chicago design community during the 1880s, particularly his emphasis on “art which is to be made by the people and for the people”.<sup>9</sup> His paraphrasing of Abraham Lincoln’s phrase from the 1863 Gettysburg Address (“...that government of the people, by the people, for the people, shall not perish from the earth.”) resonated deeply with American designers, and linked Morris’s

---

<sup>7</sup> Louis Sullivan, *The Autobiography of an Idea*, New York: Dover Publications, Inc., 1956, p. 240. (Washington, D. C.: American Institute of Architects, 1924). See also Robert Twombly and Narcisco G. Menocal, *Louis Sullivan, The Poetry of Architecture*, New York: W. W. Norton & Company, 2000.

<sup>8</sup> Daniel Burnham (1846-1912) met John Root (1850-1891) when both worked for the architectural firm of Carter, Drake and Wight in 1872. The following year, they formed the architectural firm of Burnham and Root. William Holabird (1854-1923) and Martin Roche (1853-1927) met while working for William LeBaron Jenney and established a partnership in 1880. The firm known today as Holabird and Root was formed on the foundation of Holabird and Roche in 1928 by the sons of William Holabird and John Wellborn Root.

<sup>9</sup> William Morris often repeated this phrase, but it is perhaps best known through the collection of essays published as *Hopes and Fears for Art*, New York: Longmans, Green & Co., 1901, p. 38-70. (London: Ellis and White, 1882). Morris’s ideas were very well received--and implemented--in Chicago. The best known surviving example is H. H. Richardson’s Glessner House, designed in 1885, with an interior design featuring tiles, fabrics and wallpapers from Morris and Co.

ideas directly to the ideals of democracy.<sup>10</sup> By associating democratic principles with design reform, Morris also paved the way for Sullivan's fundamental design position that architecture should be designed in response to the needs of the client. This position remained constant among all of the Chicago architects from this period, regardless of later rifts among them over the issue of Beaux-Arts design.<sup>11</sup>

Although William LeBaron Jenney's design work often reflected his Parisian education, Sullivan and John Wellborn Root championed an architecture that reflected the spirit of their own time--a spirit that strove for a fresh aesthetic to accompany the revolutionary structural systems that they were collectively developing with every project. Like their European counterparts, both Sullivan and Root rejected the historical references of revival styles, striving instead for a system of ornament that was integrated with architectural form rather than imposed upon it, as well as based on imaginative interpretations of nature and geometry.

Often, it is in the interior spaces that this experimental design vocabulary appears first. "The interior embellishment [of Sullivan's Auditorium Building, designed in 1886] is wholly Sullivan's, and some of the details, because of the continuous curvilinear foliate motifs, are among the nearest equivalents to European Art Nouveau architecture."<sup>12</sup> However, it was Siegfried Bing, traveling to Chicago in the early 1890s, who offered a definitive assessment of the Auditorium Building, writing that "all the public rooms give a monumental impression, especially the main dining room more than 195 feet high with splendidly vaulted ceilings and providing, from its tenth-floor setting, an admirable view of Lake Michigan; the banquet hall, boldly suspended, by

---

<sup>10</sup> The full text of Abraham Lincoln's Gettysburg Address, originally delivered on 19 November 1863, may be found in numerous sources, including online at Project Gutenberg: <http://www.gutenberg.org> Consulted 30 April 2013. See also *The Complete Works of Abraham Lincoln*, Vol. IX, eds. John G. Nicolay and John Hay, New York: Tany-Thomas Co., 1905, p. 209-210.

<sup>11</sup> Daniel Burnham's decision to embrace Beaux-Arts design for the World's Columbian Exposition in 1893 created a major split in the architectural community of Chicago. The fair was originally intended to showcase the "new architecture" of Chicago, but when John W. Root died unexpectedly in 1891, Burnham chose instead to turn to east coast Beaux-Arts architects to design the project. Although it is beyond the scope of this paper, it should be noted that the wounds of this rift never entirely healed.

<sup>12</sup> Leland M. Roth, *A Concise History of American Architecture*, Boulder, Colorado: Westview Press, 1980, p. 179-80.

some miracle of balance, above the immense space formed by the theater, and conceived in a richly inventive and altogether personal and inventive style. The impressive lobby with its semicircular arched portals and low colonnades is further enhanced by completely original sculptural decoration, based directly on plant forms. The finishing touch of the decor is provided by an intriguing disposition of electric lighting fixtures, which play an active role in the harmony of the main architectural lines.”<sup>13</sup> As one of the leading figures of art nouveau--and the creator of the term itself--Bing’s critical response to the Auditorium Building indicates that he deemed Chicago architecture well worthy of consideration.

Preserved in its entirety at the Art Institute of Chicago today, the Trading Room of Sullivan’s Stock Exchange Building, 1893, reveals several key elements of this new approach to architecture.<sup>14</sup> (Fig. 2) Most obvious is the unprecedented openness that resulted from the revolutionary steel frame structural system that allowed the original building to rise thirteen stories without bearing walls; the interior space is largely unencumbered by columns, and thus able to respond flexibly to whatever functions might take place here. Likewise, the use of electric lighting--already a standard practice in Chicago by the mid-1880s--further underscores Sullivan’s use of contemporary technology, in this case enhanced by the perimeter skylights that allow daylight to supplement the low wattage of 1890s light bulbs. A closer look at the Trading Room, however, draws attention to the aesthetic that animates Sullivan’s work. The stenciled ornamental patterns that ring the overhead space on the ceiling, skylights, column capitals and balconies create a visual counterpoint to the simpler materials of the trading floor. The sophisticated curving lines of the green, yellow and coral palette at the top of the wall merges with a more intensely colored pattern on the ceiling and finally, take three-dimensional form in the prolific foliage of the capitals. This is indeed a totally

---

<sup>13</sup> Siegfried Bing, *Artistic America, Tiffany Glass, and Art Nouveau*, Cambridge, Massachusetts: The MIT Press, 1972, p. 88. Bing’s report was originally prepared for M. Henri Roujon, Director of Fine Arts, Paris, in 1895.

<sup>14</sup> The Stock Exchange Building was demolished in 1972, but protests from the local community resulted in the preservation of the Trading Room and the entrance arch at the Art Institute of Chicago. The reconstructed Trading Room opened in 1977 as both an exhibit in its own right and as a functional space for museum gatherings.

designed environment in which all aspects of design are inherently related to each other in order to create a building which is both logically coherent and organically designed to meet the needs of the user.

This early emergence of a design reform movement in Chicago is akin to much of the design thinking evolving in Europe in the 1880s and 90s. However, the need to rebuild the city after the 1871 fire placed Chicago in the unique position of being forced to address architectural issues immediately--and the opportunities available for young architects within this context brought some of the most forward-thinking design talent in the US to the city in the 1870s. Word of this new architecture, later dubbed the 'Chicago School', soon spread to European cities through accounts from travelers, but also through the proliferation of design journals that characterized the late nineteenth century. The design of 'tall buildings' captured the imagination of the design world and press coverage was frequent and international. Chicago also attracted global attention when it hosted the World's Columbian Exposition in 1893, an event that drew 27.5 million people, 14 million of them, mostly Europeans, from outside the United States.<sup>15</sup> The opportunity to see 'Chicago School' architecture, whether at the Fair or simply in the city, was part of the allure.

Although architecture is generally slower to adopt new design trends than media such as painting, sculpture or decorative arts, the circumstances in Chicago formed an atypical crucible in which architects had to respond to a disastrous situation quickly and with innovative solutions--and for the most part, they were supported by the local business leaders who were determined to stay and rebuild after the fire. These men wanted a profitable return on their investments, and they were more willing than most to take a chance on new technologies such as steel and a purely hypothetical concept called the 'tall building' that would increase their property values significantly. This usually congenial relationship between architects and businessmen was also a key factor in the development of design reform thinking in Chicago.

---

<sup>15</sup> Donald L. Miller, *City of the Century, The Epic of Chicago and the Making of America*, New York: Simon & Schuster, 1996, p. 488.

Other creative professionals soon followed the example of Chicago architects. Some of the earliest were the potteries that specialized in architectural materials such as tiles and ornament. For example, the American Terra Cotta Corporation, founded by William D. Gates in 1881, not only provided ornamentation for Sullivan, Jenney, Holabird and Roche, as well as many regional designers, but eventually developed its own line of art tiles. Evidence of this work can still be seen on projects as diverse as Jenney's Manhattan Building, 1891, and the US Great Lakes Naval Training Station, 1906-10, just north of Chicago. In addition, the company developed its own line of art pottery that was marketed independently of any architectural application. Teco Pottery was introduced to the public in 1902 with a line of vases glazed in a distinctive matte green color that was intended to resemble patinated bronze. Like so much of the architectural ornament that the company produced, Teco pieces, such as the Tulip Vase introduced in 1903, were inspired by nature and often abstracted into elegant curving forms.<sup>16</sup>

This abstraction of natural forms was also evident in the leather and silver work of the designers at the Kalo Shop, founded in 1900 by five recent graduates of the School of the Art Institute of Chicago. This group of young women, led by Clara P. Barck, set up shop in the National Commercial Bank building in the heart of Chicago's financial district--perhaps in the hope of attracting customers from one of the wealthiest segments of the population. The name Kalo was a reference to the Greek word "kalos" meaning "beauty."<sup>17</sup> The group began producing metalwork in 1905, and in 1912, they opened a branch shop in New York City. All of their silver pieces were handmade and many were designed with the same elegant line that is visible in the best of Teco pottery. Designer Mildred Belle Bevis, for example, created a set of silver vessels for a

---

<sup>16</sup> Teco Pottery also established a relationship with many of the Prairie School architects such as Frank Lloyd Wright, George Elmslie and Hugh Garden, who designed a variety of pieces for them. For a detailed history, please see George A Berry III and Sharon Darling, *Common Clay, A History of American Terra Cotta Corporation, 1881-1966*, Crystal Lake, Illinois: TCR Corporation, 2003.

<sup>17</sup> For a thorough exploration of the Kalo Shop, see Carolyn Kelly's excellent masters thesis, *The Kalo Shop: A Case Study of Handwrought Silver in the Twentieth Century*, Cooper-Hewitt, National Design Museum and Parson School of Design, 2006. The Kalo Shop remained in business until 1970, although Clara P. Barck retired in 1939, turning full control of the shop over to four of her designers in 1959.

Miss Sarah Smith sometime between 1910 and 1913 which included a sugar and creamer set, a bowl, two trays and a water jug, all in a stylistic vocabulary based on simplified natural shapes.<sup>18</sup> Another piece of Kalo silver dating from c.1910 is the Lotus Bowl (Fig. 3). Although the designer remains unknown, the bowl itself embodies the design approach of the Kalo Shop during this time period; it is based on a floral form, but handled in an abstract manner. The curving hand-shaped edges form six petals, gently impressed around the rim of the bowl. At the center is a monogram incised in whiplash curved letters. The success of the Kalo Shop during the early part of the twentieth century also suggests that there was significant public demand for decorative arts designed in the ‘modern style’. As one scholar noted, “After the devastation of the Great Fire of 1871, Chicago was rebuilt as a hub of progressive design and a model of modern living.”<sup>19</sup>

Nowhere was that endorsement of ‘modern living’ more evident than in Chicago’s major department stores. With pioneering leaders such as Marshall Field, one of the three largest retailers in the US in 1880, it is not surprising that both the merchandise and the architecture of the stores were held to the most sophisticated standards. Field and his successors understood that a public image mattered, and to that end, they created a series of flagship stores on Chicago’s State Street that would attract customers from all walks of life, regardless of economic status. Looking at the merchandise was free, and if all went well, it might also result in sales. The 1907 addition to the store, designed by Charles Atwood of D. H. Burnham & Co, was an lavish tour-de-force featuring a monumental dome by Tiffany & Company. It covered over 6000 square feet at the top of a five-story atrium, and was Tiffany’s first installation of an iridescent glass mosaic dome.<sup>20</sup> Although the architecture of the store

---

<sup>18</sup> The original drawings for this set of vessels can be seen in Mildred Belle Bevis’s notebook of designs in the Ryerson and Burnham Archives at the Art Institute of Chicago. The notebook dates from 1910-13 and contains sketches in pencil and pen for a variety of silver pieces and jewelry. (1980.1, Box 1).

<sup>19</sup> Carolyn Kelly, *The Kalo Shop: A Case Study of Handwrought Silver in the Twentieth Century*, Cooper-Hewitt, National Design Museum and Parson School of Design, 2006, p. 6.

<sup>20</sup> See National Historic Landmarks Program website for information on the Marshall Field Company Store, which was listed as a National Historic Landmark in 1978.

is decidedly Beaux-Arts, the dome maintains much of the art nouveau sensibility characteristic of Tiffany Studio's earlier work.

Two blocks south on State Street, Louis Sullivan had already designed an iconic modern department store for Schlesinger & Mayer in 1898.<sup>21</sup> (Fig. 4) Adler and Sullivan developed several designs for these local retailers throughout the 1890s, but it was not until 1898 that Schlesinger & Mayer finally made a decision on how they wanted to proceed. By that time, Adler and Sullivan had parted ways, and Sullivan inherited the commission for the project. As always, he began his design process by studying the client's requirements for the space; in this case, he also looked closely at the Bon Marché department store in Paris designed by Charles Boileau and Gustave Eiffel in the 1870s. Like Boileau and Eiffel, Sullivan understood that flexibility was crucial to a successful retail design; fashion trends changed often, so the ability to move merchandise from one area to another, or to reconfigure display cases with ease, was a necessity. However, Sullivan had one clear advantage over the earlier department store designers in the form of structural steel. Using the same steel grid framework that he used for office buildings allowed him to create open spaces with relatively few columns, thus providing his clients with the maximum amount of display space on each of the twelve floors. Throughout the interior, Sullivan's characteristic organic ornament was also on display--on elevator cages, column capitals and window frames.

On the exterior of the building Sullivan took advantage of his client's need to showcase merchandise and designed full-height windows on the first and second floors. In essence, these windows created what is today called a glass curtain wall since it is literally hung from the structural grid and has no significant function in supporting the weight of the building. The most dramatic element of Sullivan's exterior design was his extravaganza of organic ornamentation. The cast iron decoration stretched along the

---

<http://tps.cr.nps.gov/nhl/detail.cfm?ResourceId=1752&ResourceType=Building> Consulted 30 April 2013.

<sup>21</sup> Schlesinger and Mayer owned the store until 1904 when they sold it to H.G. Selfridge & Co. which quickly sold it on to Otto Young, who then leased it to Carson Pirie Scott. In 2007, Carson Pirie Scott closed the store and transferred any remaining merchandise to their suburban stores. Today, it is owned by Joseph Freed and Associates LLC, a Chicago-based real estate developer, and has been renamed the Sullivan Center. It houses retail spaces on the first two floors as well as office spaces and educational spaces.

State Street facade and turned the corner onto Madison Street, surrounding every window and entrance with lush ornamentation that invited passersby into the store. At the corner intersection, Sullivan took a cue from the Bon Marché and designed a curving entrance; the difference was that his was covered in a profusion of foliate ornamentation. Potential customers entered the store through a bower of decorative embellishments, an experience that remains memorable even today when one enters through revolving doors. On the second level above the main entrance, there was another full height window, this time in curved glass, that proclaimed its dazzling presence to pedestrians strolling down either State or Madison streets. When lit at night, it was even more spectacular.

From the third to the eleventh story, Sullivan's design shifted into a much more restrained vocabulary, as if to provide a counterpoint to the luxuriant display of ornament below. Crisp white terra cotta tiles framed the large windows and a subtle line of grey tiles delineated a strong horizontal line above and below each window, stretching across all elevations of the building. On the twelfth floor, a narrow loggia with an ornamental cornice capped off the building. By creating a clear contrast between the highly decorative base and the understated upper floors, Sullivan designed a definitive expression of his new architectural aesthetic. It was unequivocal in its use of the most current technology available; it embraced natural forms as a primary source of human pleasure and delight; it categorically refused to rely on built forms of historical periods, and it embodied the concept of living in the modern age. These were beliefs shared by creative workers throughout the world who described themselves as supporters of art nouveau. The closing lines of Sullivan's 1896 essay, *The Tall Building, Artistically Considered*, bring us back to William Morris once again: "...when we know and feel that Nature is our friend, not our implacable enemy, ... then it may be proclaimed that we are on the high road to a natural and satisfying art, and architecture that will soon become a fine art in the true, the best sense of the word, an art that will live because it will be of the people, for the people, and by the people."<sup>22</sup>

---

<sup>22</sup> Louis Sullivan, "The Tall Office Building, Artistically Considered" *Lippincott's Magazine* 57 (March 1896) p. 403-09.

Chicago has always been a city of “new art” in the sense that it was reborn in the aftermath of near total destruction in 1871, but it is as a center of progressive culture and design that it is also an art nouveau city. This brief essay touches only on a sampling of the myriad design projects based on design reform ideas and values during the late nineteenth and early twentieth centuries. Architecture clearly led the way in the exceptional circumstances of redesigning the city, but painters, sculptors, ceramists, furniture makers, metalworkers, textile designers and graphic designers were equally involved in embracing the principles of design reform--and living a ‘modern life’. The drive for new aesthetic vocabularies in every discipline consistently asserted a desire for forms that responded to contemporary needs and ideas; and the rejection of historical motifs was almost universal among Chicago’s forward-looking designers. Similarly, the acceptance and adoption of new materials and technologies was characteristic of these art nouveau artists, whether it was the innovative printing processes used in creating Will Bradley’s posters and chapbooks or the use of structural steel in Chicago skyscrapers. An attitude of openness to new ideas and a willingness to experiment with new technologies, new forms of expression and new models of collaboration between design and commerce all reflected the underlying principles of art nouveau.