The Failed Technology Museum of Catalonia: Engineers and the Politics of the Musealization of Technology in Barcelona (1929 – 1939)[1]

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Introduction: Engineers, Politics and Display in Barcelona

In the night of May 29th 1937, seven Italian Savoia-Marchetti planes headed towards the Catalan coast from their base in the island of Mallorca and bombed Barcelona. It was the first nocturnal air raid in the city, and the one which had provoked more casualties up to that moment since the outbreak of the Spanish Civil War (1936-1939). On June 7th, while the city panicked again because of the presence of the fascist heavy cruiser *Canarias* in its waters,[2] the President of the Permanent Industry Committee of the Catalan government wrote to engineer Santiago Rubió, the Director of the Barcelona School of Industrial Engineering.[3] In the letter, Rubió was asked to urgently submit by the following week a list of machines and other objects to be included for display in the Technology Museum of Catalonia (*Museu Tècnic de Catalunya*).[4] It was

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[2] Joan Villarroya, *Els bombardeigs de Barcelona durant la Guerra Civil (1936-1939)* (Barcelona: Publicacions de l'Abadia de Montserrat, 1999), pp. 193-210.

[3] Comitè Permanent d'Indústria, "Museu Tècnic de Catalunya" (letters to Santiago Rubió), 12/06/1937, Box 00441, Historical Archive of the Escola T. S. d'Enginyeria Industrial de Barcelona (hereinafter AhEIB).

[4] We have translated "Museu Tècnic de Catalunya" as "Technology Museum of Catalonia." In general terms, the Catalan word "tècnica" in the 1930s was extensively used in a similar way as we currently use "tecnologia" in Catalan or "technology" in English. At that time, "tecnologia" was much more restrictively

the first official attempt to create a national museum of technology in Barcelona on the grounds that there was "no greater need than gathering all the equipment that can give an idea of the technical progress of our industry and show the paths opened to industrial progress."[5]

The Technology Museum of Catalonia never materialized. But how come was a national museum of technology perceived as an urgent need in such a war context? What kind of museum did the government and the engineers envision? How was technology going to be displayed? To which publics? These questions cannot be answered straight away. Most of the historical sources regarding the creation of the museum were lost or destroyed, either when the Catalan government left Barcelona just before the fascist troops took the city over in January 1939, or in the aftermath of the war. In fact, only a governmental order and four (almost identical) short administrative letters sent to Santiago Rubió are left.[6] However, we argue that this failed attempt is worth studying because of the light it can throw on how engineers approached the musealization of technology in this period, and that such a serious historiographical challenge can be

used and mostly referred to the study of the "tècnica" (for instance, the journal of the Barcelona Association of Industrial Engineers was named *Tècnica. Revista Tecnològico Industrial*). For a critical historicization of the concept of "technology" in English, see: Ruth Oldenziel, Ruth, "Signifying Semantics for a History of Technology," *Technology and Culture*, 2006, 47(3):477-485; Eric Schatzberg, "'Technik' Comes to America: Changing Meanings of 'Technology' before 1930," *Technology and Culture*, 2006, 47(3):486-512; Eric Schatzberg, *The Concept of Technology: A Critical History* (Chicago: University of Chicago Press, forthcoming).

[5] "Ordre que crea una Comissió perquè formuli un pla constitució del Museu Tècnic de Catalunya junt amb l'Oficina d'Informacions i Petits Invents," *Diari Oficial de la Generalitat de Catalunya (DOGC)*, 1937, V:I:85, p. 1264.

[6] We have not found any other documents related to this project in the archival records of the Permanent Industry Committee and the Department of Economy, which are preserved in the National Archive of Catalonia (hereinafter ANC). All the documents produced by the Committee after July 1936 did not survive the war ("Les actes de les sessions del Comitè Permanent d'Indústria dels mesos anteriors a la Guerra Civil," *Butlletí de l'Arxiu Nacional de Catalunya*, 2007, 18:21-22). Besides, there are no records related to the Technology Museum of Catalonia in the Santiago Rubió Papers (ANC), the archive of the *Fundació Rubió i Tudurí* in Maó (Menorca), or the *Fundació Privada Nicolau Rubió i Tudurí* in Calabuig (Girona) (we thank Margarita Rubió for providing access to the archive of the *Fundació*). We have not found any relevant document neither in the Estanislau Ruiz-Ponsetí Papers (held at the archive-library *Pavelló de la República*). No mention of the museum is made in the *Butlletí dels Museus d'Art de Barcelona* (published by the Barcelona Board of Museums from June 1931 to December 1937), nor in the journal *Tècnica*, published by the Barcelona Association of Industrial Engineers.

addressed by analyzing the international and local contexts, the genealogy of the display of technology in the city, and the politics of the Catalan engineering profession.[7] The scarcity of sources for the history of technology of the Spanish Civil War should not prevent historians to write good stories (or at least to attempt to do so) about a period over which silence would otherwise loom twice.

The failed Technology Museum of Catalonia must be internationally placed in the context of the interwar boom of national industrial museums. In a context of rising political ascendancy of engineering professionals and growing techno-nationalism after World War I, there was a proliferation of what Svante Lindqvist referred to as "olympic stadiums of technology."[8] Most national industrial museums that had been created in Europe in the nineteenth century were refurbished and expanded during this period, and new ones were inaugurated in cities such as Prague, Vienna, Warsaw, Stockholm, Oslo, or Budapest, adopting increasingly standardized techniques of display and narratives.[9] In the United States, the European industrial museums were seen as "museums of the new age" that would help increase the country's productivity and would soothe social conflict, and were appropriated during the 1920s and 1930s in the form of privately-run institutions such as the Chicago Museum of Science and Industry, Philadelphia's Franklin Institute, and the New York Museum of Science and Industry.[10]

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[7] On another failed museum (of which much more evidence is preserved), see: Arthur Molella, "The Museum that Might Have Been: The Smithsonian's National Museum of Engineering and Industry," *Technology and Culture*, 1991, 32(2):237-263.

[8] Svante Lindqvist, "An Olympic Stadium of Technology: Deutsches Museum and Sweden's Tekniska Museet," in *Industrial Society and its Museums*, edited by Brigitte Schroeder-Gudehus (Langhorne: Harwood Academic Publishers, 1993), pp. 37-54.

[9] Brigitte Schroeder-Gudehus (ed.), *Industrial Society and its Museums* (Langhorne: Harwood Academic Publishers, 1993); Peter Morris, Peter (ed.), *Science for the Nation: Perspectives on the History of the Science Museum* (London: Palgrave, 2010); Eve Duffy, Representing Science and Technology: Politics and Display in the Deutsches Museum, 1903-1945 (PhD Diss., University of North Carolina, 2002); Hellmut Janetschek, "From the Imperial-Royal Collection of Manufactured Products to the Museum of Technology and Industry in Vienna," *History and Technology*, 1995, 17:191-213; Lindqvist, "An Olympic Stadium of Technology" (cit. note 8).

[10] Jaume Sastre-Juan, "Pilgrimages to the Museums of the New Age: Appropriating European Industrial Museums in New York City (1927-1937)," *Science Museum Group Journal*, 2016, 6, doi: http://dx.doi

As in all the above-mentioned cases, engineers played a crucial role in the proposals for creating a large museum of technology in interwar Barcelona. During the first decades of the 20th century, Catalan engineers had portrayed themselves as a third class of scientific mediators between capital and labor, entitled to achieve "efficiency" in society at all levels, from scientific management within the factory to the economic rationalization of the nation. The change of political regime in 1931 was an opportunity to implement these technocratic aspirations. After the instauration of the Second Spanish Republic and the creation of the Catalan government of the *Generalitat de Catalunya*, their increased participation in parliamentary politics and governmental institutions went also hand in hand with a techno-nationalist shift in their discourse, which was aimed at making both technology Catalan and Catalonia a technological nation.[11]

This article explores how the (failed) proposal for creating a national museum of technology was intertwined with the long-lasting role of the engineering community in the politics of musealization of technology in Barcelona. By studying the previous attempts by engineers at creating industrial museums in Barcelona and their socio-political context, this paper aims at understanding why the Technology Museum of Catalonia was about to be created during the Spanish Civil War, and to what extent (and in what sense) it could be thought as a political tool for engineers. The first section will analyze the museological proposals in the aftermath of the 1929 Barcelona International Exhibition, as part of a long tradition of technological display aimed at increasing industrial productivity and improving technical education. The second section will focus

.org/10.15180/160606. See also: Russell Douglass Jones, Engineering History: The Foundation of Industrial Museums in the United States (PhD Diss., Case Western Reserve University, 2001).

[11] Jaume Valentines-Álvarez, Tecnocràcia i catalanisme tècnic a Catalunya als anys 1930: Els enginyers industrials, de l'organització del taller a la racionalització de l'estat (PhD Diss., Universitat Autònoma de Barcelona, 2012); Jaume Valentines-Álvarez, "'Por muchos caminos se llega a Roma': Ingeniería, catalanismo y tecnocracia en la Segunda República Española," *Ayer. Revista de Historia Contemporánea*, forthcoming.

on the musealization of the old Catalan forge as an exemplary case of the techno-nationalist efforts by engineers in the making of a respectable technological past for the nation. The third section will explore how these two traditions of technological display would have been articulated in the Technology Museum of Catalonia, putting it in the context of the role played by engineering professionals during the Spanish Civil War.

1. The "Battles of Production" on Display: Envisioning the Technotheca

In Barcelona, engineers had been behind the promotion of museums of technology since the mid-nineteenth century.[12] In fact, the birth of the profession itself ran parallel to the creation of educational museums and the emergence of new "museological" engineering practices.[13] Since the Barcelona School of Industrial Engineering was officially established in 1851 as part of the government policies to strengthen the liberal state and the Capitalist economy, it held a museum intended to complement the theoretical training through the observation and hands-on manipulation of technical artefacts.[14] The collection of this museum included a number of machines, models and innovations of different industrial sectors, and worked as a scientific space in which new foreign

[12] On the creation of the engineering profession in Spain, see: Manuel Silva, "The Engineering Profession in Spain: From the Renaissance to Modern Times," *History of Technology*, 2010, 30:63-78; Guillermo Lusa-Monforte, Antoni Roca-Rosell, "Historia de la Ingeniería Industrial: La Escuela de Barcelona (1851-2001)," *Documentos de la Escuela de Ingenieros Industriales de Barcelona*, 2005, 15:13-93; Manuel Silva, Guillermo Lusa-Monforte, "Cuerpos facultativos del Estado versus profesión liberal: la singularidad de la ingeniería industrial," in *Técnica e Ingeniería en España. Vol. IV: El Ochocientos. Pensamiento, profesiones y sociedad*, edited by Manuel Silva (Zaragoza: Real Academia de Ingeniería/Institución, 2007), pp. 227-290.

[13] For the importance of museums and collections of machines in the consolidation of new forms of "analytical" engineering in professional schools during the first half of the nineteenth century, see: John Pickstone, "Museological Science? The Place of the Analytical/Comparative in Nineteenth-Century Science, Technology and Medicine," *History of Science*, 1994, 32(2):111-138.

[14] For an overview of the museums in engineering training centers in Barcelona, see: Antoni Roca-Rosell, Jaume Valentines-Álvarez, Carlos Acosta-Rizo, "Le patrimoine du génie industriel à Barcelone. Les collections éducatives: origines, préservation et avenir," in *Cabinets de curiosités, collections techniques et musées d'arts et métiers: Origines, mutations et usages*, edited by Irina Gouzévitch *et al.* (Paris: CNAM, in press).

technologies, such as the electric telegraph, circulated and were appropriated.[15] In 1886, a new museum at the School of Industrial Engineering displayed a collection of minerals, fossil fuels, raw materials and manufactured products from Catalonia, Spain and abroad in order to showcase the development of production to students and industrialists while promoting the so-called "industrial advancement of the country."[16] In the first decades of the 20th century, these museums of technology, with their double pedagogic and economic aim, still occupied a relevant part of the training spaces of the engineering profession,[17] while other museological spaces for the popularization of science and technology flourished in other spaces of the city.[18]

(Fig. 1 here)

Apart from these educational museums, engineers were also behind the public display of technology in other urban spaces, especially the many industrial exhibitions organized in this period.[19] Among many others, the city hosted the Industry, Crafts and Arts Exhibition in 1860, the General Catalan Exhibition in 1871, and the Catalan Industry

[15] Guillermo Lusa-Monforte, "Documentos de los primeros años de la Escuela Industrial Barcelonesa (1851-1855)," *Documentos de la Escuela de Ingenieros Industriales de Barcelona*, 1996, 6, p. 84.
[16] "Museus," 1868-1883, Box 00440, AhEIB; *Escuela de Ingenieros Industriales, Barcelona* (Barcelona: Escuela de Ingenieros Industriales de Barcelona, 1878).
[17] In 1910, the museums at the School were thought as being "the rational link" between the theoretical courses and the modern laboratories, as well as tools to "encourage the most lazy students." Gaietà Cornet *et al*., "El proyecto de nueva Escuela de Ingenieros Industriales de Barcelona," *Revista Tecnológico-Industrial*, 1910, 33, p. 255 (quoted in: Antoni Roca-Rosell, "L'enginyeria de laboratori, un repte del nou-cents," *Quaderns d'Història de l'Enginyeria*, 1996, 1, p. 211); *Memoria correspondiente al curso de 1909 a 1910* (Barcelona: Impr. de Pedro Ortega, 1910), pp. 75-80; Guillermo Lusa-Monforte, "La Escuela de Ingenieros en Guerra (1936-1938)," *Documentos de la Escuela de Ingenieros Industriales de Barcelona*, 2007, 17, pp. 51-52.
[18] The most relevant case for our argument in this paper is the popular *Mentora Alsina* Physics Laboratory created in 1907 by Ferran Alsina, a technician and right-hand man of the Güell family (well-known for having been the main patron of Gaudí). This laboratory featuring hands-on educational displays was mainly focused on physics, but it also included old technical devices such as screws, pulleys, sheerlegs, gears and scales, as well as more complex machines such as Clarke's machines, telegraphs, electrical motors, Dixie magnetos, multimeters, dynamos and models of steam engines. See, for example: *Llegats i donacions a la ciutat de Barcelona per obres de cultura* (Barcelona: Ajuntament de Barcelona, 1922), pp. 29-49; *El Laboratori de Física Experimental Mentora Alsina: Guia de l'exposició* (Terrassa: mNACTEC, 2006).
[19] As Miriam Levin and other scholars have pointed out, we could even see the city itself with its technological infrastructures and spectacles as a kind of museum of technology in which engineers played an important role. Miriam Levin, "The City as a Museum of Technology," in *Industrial Society and its Museums*, edited by Brigitte Schroeder-Gudehus (Paris: Harwood Academic Publishers, 1993), pp. 27-36; Tiago Saraiva, *Ciencia y ciudad: Madrid y Lisboa, 1851-1900* (Madrid: Ayuntamiento de Madrid, 2005).

Exhibition in 1877, in which boilers, pumps, engines, presses, gas lamps and textile products were stacked in the commercial stands while a steam locomotive of the 1848 first railway line in Spain was shown over a fake bridge.[20] But there is no doubt that the climax were its two international exhibitions in 1888 and 1929. The 1888 Exhibition was held at the Ciutadella Park and included an impressive Hall of Machines alongside other technological attractions such as a huge captive balloon and the sumptuous electric lights of the *Palacio de la Industria*.[21] The 1929 Exhibition took place at the Montjuïc Hill, which had been urbanized for the occasion, and was the context in which one of the first proposals to create a permanent and publicly accessible museum of technology in Barcelona arose.[22]

The 1929 Exhibition had its roots in an Exhibition of Electrical Industries planned for 1917 by electricity industrialists linked to the right-wing Catalan nationalist party *Lliga Regionalista*, which headed the Catalan regional government of the *Mancomunitat de Catalunya* from 1914 to 1923. The Exhibition of Electrical Industries never took place because of World War I and other local circumstances, but it was resumed after 1923 in the very different political context of the Primo de Rivera military dictatorship (1923-1930).[23] The 1929 Barcelona International Exhibition was presented by the regime as a

[20] The objects exhibited at the Catalan Industry Exhibition can be studied through the collection of pictures published in: *Exposición Catalana de 1877* (Barcelona: [s.n.], 1877). The photographs show that the approach to display was the decontextualized style typical of the machine halls at international exhibitions.
[21] Agustí Nieto-Galan, "Scientific 'Marvels' in the Public Sphere: Barcelona and its 1888 International Exhibition," *HoST. Journal of History of Science and Technology*, 2012, 6:33-63.
[22] As it is well known, many permanent industrial museums grew out of international exhibitions, which also fostered the creation of institutions devoted to technical and vocational education. The creation of the South Kensington museum, which stemmed from the 1851 Crystal Palace exhibition with a clear educational program in mind, the network of museums of the Smithsonian Institution, which grew out of the 1876 Philadelphia Centennial Exhibition, or the Chicago Museum of Science and Industry, the creation of which was linked to the 1933 Century-of-Progress Exhibition, are just three examples of this international trend. On these connections, see, among others: Eugene Ferguson, "Technical Museums and International Exhibitions," *Technology and Culture*, 1965, 6:30-46; Bruce Robertson, "The South Kensington Museum in Context: An Alternative History," *Museum and Society*, 2004, 2(1):1-14; Robert Rydell, "World Fairs and Museums," in *A Companion to Museum Studies*, edited by Sharon MacDonald (Oxford: Blackwell, 2006), pp. 135-151.
[23] On the history of the planning of the exhibition, see: Lucila Mallart, "From Electricity to the Photo Archive: National Identity and the Planning of the 1929 Barcelona International Exhibition," in *Urban*

symbol of the industrial prosperity and modernity of Spain. Engineers proudly celebrated it as a "triumph" of both the profession and the applied sciences: technology had been the key ingredient of the most successful features of the exhibition, such as the colourful Magic Fountain, the light beams over the city, the funicular railway, the escalators, the roller coasters, and all the machines, engines, gadgets and inventions that crowded the several pavilions of the exhibition.[24]

In the aftermath of the 1929 Exhibition, a debate aroused among the city elites about what to do with the pavilions and spaces at the Montjuïc Hill. Several proposals were discussed, including an ambitious plan for a university campus and a permanent trade fair aimed at going beyond the temporary trade fairs which had been held in the Ciutadella Park between 1920 and 1925.[25] In this context, two proposals for creating a permanent large-scale industrial museum were put forward by the two most publicly well-known characters behind the engineering spectacle of the exhibition. The first one came from the Chief Engineer of the Exhibition, Marian Rubió, a conservative military engineer who had been one of the first popularizers of Taylorism and the theories of the human motor in Spain, as well as an active promoter of social engineering and vocational education.[26]

Histories of Science: Making Knowledge in the City, 1820-1940, edited by Oliver Hochadel and Agustí Nieto-Galan (London and New York: Routledge, 2019), pp. 208-226.

[24] Jordi Ferran, Agustí Nieto-Galan, "The City of Electric Light: Experts and Users at the 1929 International Exhibition and Beyond," in *Barcelona: An Urban History of Science and Modernity, 1888-1929,* edited by Oliver Hochadel and Agustí Nieto-Galan (London and New York: Routledge, 2016), pp. 223-242. For a contemporary overview of the Exhibition from the point of view of the Catalan(ist) engineering and scientific elite, see the monographic number that the journal *Ciència* devoted to it: *Ciència: Revista catalana de ciència i tecnologia*, 1930, 5.

[25] For an introduction to this debate with a comprehensive list of proposals, see: Eusebi Busquets, "Un cop finida l'exposició," *Arts i bells oficis: Revista mensual del Foment de les Arts Decoratives*, 1930, February, pp. 23-26.

[26] See, for example: Marian Rubió, *El trabajo humano* (Barcelona: Publicaciones de la Cámara Oficial de Industria de Barcelona, 1916). His proposals to popularize social engineering included the promotion of exhibitions and museums. In the first decades of the twentieth century, some of the most influential Catalan engineers, such as Marian Rubió, Josep M. Tallada and Carles Pi-Sunyer, lobbied for exhibitions of industrial safety, such as the Exhibition of Social Economy and Labor Hygiene and Safety at the Social Museum (1911), the Exhibition of Industrial Safety at the Barcelona Association of Industrial Engineers (1926), and the Museum of Industrial Safety (proposed in 1933). *Guia de les institucions científiques i*

In an article in the widely read newspaper *La Vanguardia*, Marian Rubió proposed the creation of a big industrial-commercial museum: the Technotheca. It was to be housed in the pavilions of the Exhibition and was to display a comprehensive collection of "all raw materials and all manufactured products that are included in the technical, agricultural, industrial and artistic activity of our country."[27] The name "Technotheca" was inspired by the museographical landscape in Munich, a city which enjoyed, according to Marian Rubió, a "high prestige in the art sphere because of its valuable Pinacotheca [art gallery] and the Glyptotheca [sculpture museum]."[28] The significant omission of the Deutsches Museum, well known in Catalan scientific and engineering circles, points to the fact that the Technotheca was envisioned as a very different kind of museum.[29] As we will see, it was more in tune with commercial trade fairs and the educational museography of engineering schools than with most of the main interwar national industrial museums, which displayed technical artefacts in a chronological order within a long-term sequential narrative and put engineers at the core of both national identity and the evolutionary progress of humanity.[30]

The Technotheca was to be a semi-private enterprise: the buildings would be granted by the City Council to the associations or corporations that could turn them into "museums or permanent archives of the elements of their own branch of industry" in order

d'ensenyança (Barcelona: Diputació de Barcelona, 1916), pp. 73-74; Carles Pi-Sunyer, "Los carteles educativos," *Técnica*, 1926, 49:92:117-120; Marian Rubió, "Los museos de protección industrial," *La Vanguardia*, August 13th 1933, p. 3.

[27] Marian Rubió, "La 'Tecnoteca' de Montjuich," *La Vanguardia*, October 18th 1929, p. 5.

[28] *Ibid*.

[29] Antoni Roca-Rosell, "Overview: An Approach to the Historiography of Technology in Spain," *History of Technology*, 2010, 30:10-18, p. 11. In the 1930s, the students of the School of Industrial Engineering used to visit the Deutsches Museum during their end-of-the-year trips. See, for example: *Memorias de los viajes de prácticas efectuados por esta Escuela durante el curso de 1933-1934* (Barcelona: Escuela de Ingenieros Industriales, 1934), pp. 90-91.

[30] On commercial museums see, for example, Steven Conn's account of the Commercial Museum in Philadelphia: Steven Conn, *Museums and American Intellectual Life, 1876-1926* (Chicago: University of Chicago Press, 1998), pp. 115-150. On national industrial museums, see: Brigitte Schroeder-Gudehus, *Industrial Society and its Museums* (cit. note 9).

to exhibit their products, to sell their services and to organize monographic exhibitions and specialized contests.[31] According to Marian Rubió, the Technotheca would be important to "perfect industrial procedures" in order to avoid being "ran over by foreign competitors" and to solve the "problems posed to the national economy."[32] In line with the "olympic internationalism" behind world's fairs, which conceived international commerce as the peaceful alternative to war in settling geopolitical conflicts, Marian Rubió conceived the Technotheca as "a first-class technical tool for waging the great battles of the present time: the battles of production and consumption."[33]

The main goal of the Technotheca was to improve the national productive power both through commercial displays of manufactured products and through educational displays to promote technical education. On the one hand, the Technotheca was heir to the trade fairs and the several commercial museums created within very heterogeneous Catalan institutions, such as the main employers' association *Foment del Treball Nacional*, the commercial association *Societat de Geografia Comercial de Barcelona*, and the white-collar labor union CADCI.[34] It is significant in this regard that José Planas, a member of the Official Association of Sales Representatives (*Colegio Oficial de Agentes Comerciales)*, explicitly mentioned the Technotheca as being in line with his call for reinstaurating in Montjuïc an annual trade fair that would stimulate the economy so that "the smoke of our chimneys keeps producing the thick and glorious plume which charactherizes our beautiful city."[35] On the other hand, the Technotheca shared the

[31] Rubió, "La 'Tecnoteca' de Montjuich" (cit. note 27).
[32] *Ibid*.
[33] *Ibid*. On "olympic internationalism," see: Geert Somsen, "A History of Universalism: Conceptions of the Internationality of Science from the Enlightenment to the Cold War," *Minerva*, 2008, 46:361-379.
[34] *Estatuts del Foment del Treball Nacional* (Barcelona: Tip. Domingo Casanovas, 1901), p. 74; *Estatuts de la Societat de Geografia Comercial de Barcelona* (Barcelona: Vda. de Luis Tasso, 1909), art. 27; *Reglament de la Secció Permanent d'Educació i Instrucció (Centre Autonomista de Dependents del Comerç i la Indústria)* (Barcelona: [s.n.], 1920), p. 2.
[35] José Planas, "Al margen de la Exposición Internacional de Barcelona," *La Vanguardia*, November 10th 1929, p. 25.

educational aims of the already mentioned museums at the Barcelona School of Industrial Engineering. Marian Rubió conceived it as an educational center in which students would find "a really efficient object lesson."[36]

Carles Buigas, the acclaimed engineer behind the design of the Magic Fountain, enthusiastically embraced Marian Rubió's ideas. In a text published by the *Butlletí de la Cambra Mercantil*, he expanded the scope of the proposal to include technical libraries, archives of catalogues of industrial producers, and an international commercial information service that would provide industry with all kind of data regarding production costs, technical procedures, patents, etc.[37] Inspired on the *Bureau de recherches et inventions* in Paris, his Technotheca would also include "research and invention laboratories devoted to the contents of each palace," in line with the rhetorics behind many of the first national industrial museums, which included among their missions to become technological research centers and powerful aids to invention.[38] Moreover, the museum was also to be surrounded by a technological garden, "the first Park of Light in the world," which would became a "sedative" for the "stressed nervous systems" of the

[36] Rubió, "La 'Tecnoteca' de Montjuich" (cit. note 27). On the nineteenth-century Pestalozzian "object-based epistemology," see for example: Steve Conn, *Museums and American Intellectual Life, 1876-1926* (Chicago: University of Chicago Press, 2000); James Secord, "Monsters at the Crystal Palace," in *Models: The Third Dimension of Science*, edited by Soraya de Chadarevian and Nick Hopwood (Palo Alto: Stanford University Press, 2004), pp. 138-169.

[37] Carlos Buigas, "Com veig la Muntanya de Montjuïc després de la clausura de l'Exposició," *Butlletí de la Cambra Mercantil*, 1929, 92:196-202.

[38] *Ibid*., p. 198. In France, for example, the Conservatoire National des Arts et Métiers was established in 1794 with the aim of encouraging artisans to get acquainted with new machinery, so that they could improve it and help the new Republic in its economic effort (Jacques Payen, "The Role of the Conservatoire des Arts et Métiers in the Development of Technical Education up to the Middle of the Nineteenth Century," *History and Technology*, 1988, 5:315-321). At the beginning of the twentieth century, the first industrial museums in the United States were also conceived as venues in which inventors could obtain new ideas by studying the historical development of technology (Jaume Sastre-Juan, "'Science in Action': The Politics of Hands-on Display at the New York Museum of Science and Industry," *History of Science*, 2018, Epub ahead of print, 10.1177/0073275317725239). Regardless of this rhetorics, however, they almost never acted as research centers (Jones, Engineering History (cit. note 10)). Instead, national industrial museums have been many times research centers for the history of technology. In Vienna's Technisches Museum the projected research laboratory was never implemented, but in 1931 an institute for the history of technology was established following the inspiration of Conrad Matchoss' historical researches at the Deutsches Museum (Janetschek, "From the Imperial-Royal Collection" (cit. note 9)).

working class population of Barcelona and "an injection of poetic phantasy for our exceedingly materialistic life: a positive moral hygiene."[39]

In 1932, three years after, Carles Buigas pushed again for the Technotheca. This time he adapted his discourse to the change of political regime after the establishment of Catalan home rule and the *Generalitat de Catalunya*. Buigas used a Catalan nationalistic tone to portray his proposed museum as a necessary institution to foster industrial development. He conceived the main avenue of the 1929 Exhibition in the Montjuïc hill as the monumental center of the capital of the new self-governed Catalonia, with buildings for the government offices, the university, and a technological hub formed by "a Laboratory of Research and Inventions, a Center for Technological Information, [and] an Industrial Museum."[40] In this new version, the Technotheca was therefore to be located in the midst of what he envisioned as "the brain and heart of Catalonia," the core of political and symbolic power of the nation.[41]

While the Montjuïc hill never became a political or technological center in the way Buigas envisioned, it became indeed a museum cluster. In 1934 the National Art Museum of Catalonia opened its doors in the monumental National Palace, and in 1935 the Archaeological Museum of Catalonia was inaugurated in the Graphic Arts pavilion of the Exhibition.[42] Technology, however, did not participate in the symbolic and institutional construction of the nation through display. Marian Rubió, a military engineer, and Carles Buigas, an engineer trained in non-prestigious foreign institutions, did not find support within the main Catalan engineering associations, and private industry preferred to use the pavilions of the Montjuïc hill to hold an annual Trade Fair

[39] Buigas, "Com veig la Muntanya" (cit. note 37), p. 202.
[40] Carlos Buigas, "Barcelona monumental," *La Vanguardia*, April 24th 1932, p. 5.
[41] *Ibid*.
[42] Eva March Roig, "La Generalitat republicana: Algunes precisions sobre la seva actuació en matèria de museus i patrimoni," *Rubrica Contemporanea*, 2014, 3(5):109-131.

from 1933 on instead of embarking on the ambitious hybrid project of a permanent museum-laboratory-fair called Technotheca.[43]

2. Techno-nationalism on Display: The Case of the Catalan Forge[44]

Buigas' last proposal ran parallel to the political stance that the Catalan engineers took since the proclamation of the Second Spanish Republic (1931-1939), which consisted in the dual move of making Catalonia a technological nation and at the same time making technology Catalan. Engineers wholeheartedly supported the new Catalan government, and actively participated in it in many ways. In particular, some industrial engineers became MPs, some participated in the commissions that designed the new government departments, and others held high-rank offices in the *Generalitat de Catalunya*. They aimed at going beyond their professional activity in the workshop and the factory and shaping the new administrative and infrastructural organization of the nation through their expertise in economics, psycotechnics, taylorism, standardization or statistics. In addition to building a technological nation, Catalan engineers and technicians also made efforts towards "catalanizing" technology.[45] The Barcelona Association of

[43] The contemporary official discourse on the crucial economic role of the Barcelona Trade Fair can be found in: David Ferrer, "Valors i eficàcia de les Fires," *Industria Catalana*, 1934, 11:123-137. The promoters' rhetoric of the Fair as an "economic motor" of the country has thriven to the present day. See, for example: Màrius Carol, *La Fira: Motor econòmic* (Barcelona: Fira de Barcelona/Lunwerg, 2001); Marta Gustà, Montserrat Recasens, *1888-1988. Barcelona: Cent anys de fires* (Barcelona: Fira de Barcelona, 1988).

[44] This section draws on the more detailed account of the musealization of the Catalan forge in: Jaume Valentines-Álvarez, "The Quest for the Technological Soul of the Nation: The Catalan Forge and the Display of Politics (1914-1939)," in *Behind the Exhibit. Displaying Science and Technology at World's Fairs and Museums in the Twentieth Century*, edited by Elena Canadelli, Marco Beretta and Laura Ronzon (Washington DC: Smithsonian Institution Scholarly Press, forthcoming).

[45] This effort has to be understood as part of a much larger endeavour of Catalan professionals and amateurs to "Catalanize" science, technology and medicine during the first decades of the 20th century. In particular, architects, physicians and naturalists were also very active in this regard. Enrique Perdiguero, José Pardo-Tomás, Àlvar Martínez-Vidal, "Physicians as a public for the popularisation of medicine in interwar Catalonia: the Monografies Mèdiques series," in *Popularizing science and technology in the European periphery, 1800-2000*, edited by Faidra Papanelopoulou, Agustí Nieto-Galán and Enrique Perdiguero (Aldershot: Ashgate, 2009), pp. 195-215; Joaquim M. Puigvert Solà, *Josep Danés i Torras. Noucentisme i regionalisme arquitectònics* (Barcelona: Publicacions de l'Abadia de Montserrat, 2008); Ferran Aragon,

Industrial Engineers, which had an increasing political influence (while cultivating at the same time its image of a neutral and scientific body), adopted Catalan as its working language from 1931 on, and started building a technological past for the nation, for example through biographies of Catalan engineers published in its official journal *Tècnica* or through a nationalistic (pre)industrial archaeology.[46]

Santiago Rubió (the son of Marian Rubió) and his fellow engineer Antoni Gallardo had started in the 1910s a series of field trips to the Pyrenees in order to study the remnants of past technological processes, popular art and ethnological and philological traditions. In particular, they were especially interested in preserving the memory of the Catalan forge, a metallurgical procedure of allegedly medieval origin which had been appropriated worldwide between the seventeenth and the nineteenth centuries. The young engineers collected and studied old tools and machines, gathered old workers' oral memories, and mapped the sites of old mines and forges, which they conceived as the technological soul of the nation and the proof of a past industrial golden age.[47]

The collected artefacts and the results of their research were meant to be part of a reconstruction of an old forge that was to be put on display at the failed 1917 Exhibition of Electric Industries. But it was only exhibited at the end of the 1929 International Exhibition, after the exile of dictator Miguel Primo de Rivera in January 1930 and the relaxation of the anti-Catalanist policies of the regime. Santiago Rubió was by then an accomplished industrial engineer who had specialized in transport networks. He had been in charge of the construction of the subway in Barcelona and had designed two funicular

José Pardo-Tomás, "Reconstructing the Martorell. Donors and spaces in the quest for hegemony within the natural history museum," in *Barcelona: An Urban History of Science and Modernity, 1888-1929*, edited by Oliver Hochadel and Agustí Nieto-Galan (London and New York: Routledge, 2016), pp. 46-68.

[46] Valentines-Álvarez, Tecnocràcia i catalanisme tècnic (cit. note 11), pp. 107-139.

[47] Valentines-Álvarez, "The Quest for the Technological Soul of the Nation" (cit. note 44).

railways leading to two iconic religious symbols of Catalan nationalism: the Montserrat Abbey and the Núria Sanctuary.[48]

At the Electricity and Metallurgy Palace, the Catalan forge was exhibited in a room in which the dark and noisy atmosphere of the old workshops was staged through the combination of lighting effects, fake stone walls, original pieces and reconstructions. The big hammer and the other tools were also contextualized through several museographic strategies: a diorama represented the landscapes of the valleys in the Pyrenees where the forges used to be located; posters informed about the terminology of the different mechanical parts and described how they worked; a series of illustrations represented the workers and the stages through which the ore was converted into high-quality iron; and finally, photographs of contemporary forges showed how they had been adapted to new materials and energy sources.[49]

(Fig. 2 here)

This contextualist approach to the musealization of the Catalan forge differed from the typological and artefact-centered display of trade fairs and engineering schools' museums that shaped the proposals for the Technotheca. Since the main goal was not to increase industrial productivity but to showcase the technological past of the nation, different techniques of display which pointed to a broader environmental context of use were preferred, in line with the habitat groups and the dioramas that were being developed in ethnological, natural history and national industrial museums.[50] This concern with

[48] Guillermo Lusa-Monforte, *Los tres directores de la Escuela durante la Guerra (1936-1939): Santiago Rubió i Tudurí* (Barcelona: Universitat Politècnica de Catalunya, 2015), pp. 5-111.
[49] Antoni Gallardo Garriga, Santiago Rubió i Tudurí, *La farga catalana: Descripció i funcionament, història, distribució geogràfica* (Barcelona: Exposició de Barcelona, 1930).
[50] The contemporary debates in ethnological museums on whether to exhibit artefacts sequentally in order to highlight the evolutionary ascent of humanity or contextually in order to stress their place in a particular culture influenced the display techniques adopted by industrial museums, as Svante Lindqvist and Russell Jones have shown for the Swedish and US cases (Lindqvist, "An Olympic Stadium of Technology" (cit. note 8); Jones, Engineering History (cit. note 10)). Likewise, at that time natural history museums were exploring new exhibition methods such as the diorama as an alternative to typological displays (Karen

preserving the memory of past technological traditions, however, was not incompatible with the will to shape the present and the future of the nation. The forge was presented as an example of an allegedly self-sufficient technology in order to stress the pitiful current state of technological dependency and claim for a rebirth of a powerful local iron industry in Catalonia.[51]

After the exhibition, the reconstructed Catalan forge was destined to have a place in the projected Popular Art Museum, which was aimed at preserving Catalan folklore and gathering local ethnographic collections.[52] The museum was meant to be located in the so-called Spanish Village, a kind of open-air theme-park featuring traditional architecture from every region in Spain which was created in 1929 as part of the International Exhibition.[53] In this sense, the Spanish Village shared the same historicist immersive approach as other contemporary endeavours such as the folklorist museums in Skansen (Sweden) and Colonial Williamsburg (United States).[54] The forge should have been located in the main square of the "Catalan neighborhood," which was framed by buildings from all the provinces of Catalonia and also hosted a smithery from the Association of Locksmiths and Blacksmiths.[55]

The importance of displaying forges, smitheries and local artisan traditions in a national museum of technology was also put forward by Josep Munné, the president of

Rader, Victoria Cain, *Life on Display: Revolutionizing U.S. Museums of Science and Natural History in the Twentieth Century* (Chicago: University of Chicago Press, 2014)).

[51] Antoni Homs, "La siderúrgia a Catalunya: Consideracions a propòsit del Palau de la Metal·lúrgia de l'Exposició de Barcelona," *Ciència: Revista catalana de ciència i tecnologia*, 1930, 5(36):646-652.

[52] Santiago Rubió i Tudurí, "La farga catalana de l'Exposició al Museu d'Art Popular del Poble Espanyol," *Butlletí dels Museus d'Art de Barcelona*, 1932, 12:159-160.

[53] Soledad Bengoechea, *Els secrets del Poble Espanyol* (Barcelona: Poble Espanyol, 2004). Despite the fact that the "Spanish Village" had been originally conceived as a celebration of the cultural diversity of the Iberian Peninsula (and accordingly named Iberiona), the project was materialized as an expression of Spanish nationalism and the idea of the unity of the Motherland. After the proclamation of the Second Spanish Republic, the "Spanish Village" was again re-signified stressing once again national diversity.

[54] On Colonial Williamsburg, see: Mike Wallace, *Mickey Mouse History and Other Essays on American History* (Philadelphia: Temple University Press, 1996), pp. 3-33.

[55] A detailed description and a map of the "Catalan neighborhood" can be found in: *Guía del Pueblo Español* (Barcelona: Seix y Barral, 1929), pp. 23-30.

the Catalan Association of Industrial Technicians (*Associació de Pèrits i Tècnics Industrials de Catalunya*), a low-rank engineering association. In April 1936, he gave a public lecture entitled "Usefulness and Importance of Industrial Museums: The Deutsches Museum in Munich" at one of the most influential bourgeois cultural institutions in Barcelona, the *Ateneu Barcelonès*. After describing the biggest industrial museum in the world, Munné tried to convince his audience that it had to be imitated in Barcelona, but putting a strong emphasis in local craftsmanship and alleged small national inventions, since "even though few are the names that in our land can be included among the most important characters in the history of technology, we can be proud of our artisan tradition and the worldwide fame of our master smiths, master builders, master carpenters, etc."[56] The emphasis on craft "traditions" should play in Catalonia the role that "revolutionary" inventions such as steam engines or machine-tools played in England or the United States in the invention of a technological tradition for the nation.[57]

When the Civil War broke out, the project of the Popular Art Museum was aborted, the proposal for a Catalan version of the Deutches Museum was forgotten, and neither the Catalan forge nor the other national technological traditions had found a place for permanent display. However, it was in this unlikely context that the first national museum of technology was officially created in Barcelona.

3. A Museum Under the Bombs: The Technology Museum of Catalonia

On July 18th 1936, a military coup with the support of the fascists and the catholic right-wing attempted a *coup d'état* against the democratically-elected Popular Front

[56] For a review of the conference, see: "Utilidad e importancia de los museos industriales: el Deutsches Museum de Munic," *La Vanguardia*, April 26th 1936, p. 10.
[57] On how the tradition of invention plays an important role in the invention of national tradition, see: Carol Harrison, Ann Johnson, "Introduction: Science and National Identity," *Osiris*, 2009, 24:1-14.

government of the Second Republic, giving rise to a civil war that would last three years.[58] In Barcelona, the armed resistance of the anarchist labor unions together with the loyalist part of the police forces had a key role in the defeat of the sublevated military forces. This situation triggered a social revolution in which industries, farms and properties were collectivized. Members of anarchist, socialist and republican political organizations took charge of both newly created and already existing government institutions, such as the Council of Economy and the Department of Economy. In the Fall of 1936, the head of this department, the technocrat and taylorism-enthusiast Joan P. Fàbregas, who was member of the anarcho-syndicalist labor union CNT, signed the Collectivization Decree.[59] This decree legalized and regulated the collective worker control over factories and agricultural fields, and deployed the New Economy, an ambitious program which sought to increase the productivity of war industries and the efficiency of the exploitation of natural resources, including the "integral electrification" of the nation.[60] From that moment on, engineers gained more and more influence in the Department, in public affairs and in the management of factories, in detriment to the workers organized in labor

[58] The literature on the Spanish Civil War is huge. For a recent overview in English on the conflict in Catalonia, see: Pelai Pagès, *War and Revolution in Catalonia, 1936–1939* (Leiden: Brill, 2013). For an overview on science and technology during the war, see: Jesús I. Català, Antoni Roca-Rosell, "La Guerra Civil (1936-1939) i la ciència," in *La ciència en la història dels Països Catalans. Volum III (De l'inici de la industrialització a l'època actual)*, edited by Joan Vernet and Ramon Parés (València: Institut d'Estudis Catalans and Universitat de València, 2009), pp. 809-828.

[59] Before the Spanish Civil War, Fàbregas advocated that the "aristocracy of the brain" had to overcome the "aristocracy of money" (that is, the bourgeoisie), which had previously overcome the "aristocracy of blood" after the French Revolution (Joan P. Fàbregas, *La crisis mundial y sus repercusiones en España* (Barcelona: Atenas, 1933)). During the Spanish Civil War he kept on defending technocratic positions, as shown in his main book of the period: Joan P. Fàbregas, *Els factors econòmics de la revolució* (Barcelona, Bosch, 1937), especially its chapter 10, entitled "Technocracy and Revolution." The *sui generis* appropriation of the technocratic thought during the conflict has been analysed in: Jaume Valentines-Álvarez, "Engineering the Social Revolution: Technocrats in the Spanish Civil War (1936-1939)," unpublished paper presented at the 6th International Conference of the European Society for the History of Science (ESHS), Lisbon, September 1st-3rd 2014.

[60] A key figure behind this program was the socialist engineer Estanislau Ruiz-Ponsetí, who had an outstanding role in the Economic Council of Catalonia. On the New Economy, see: Francesc Artal *et al*., *El pensament econòmic català durant la República i la Guerra, 1931-1939* (Barcelona: Edicions 62, 1976), pp. 167-203; Ignasi Cendra Bertran, *El Consell d'Economia de Catalunya (1936-1939): Revolució i contrarevolució en una economia col·lectivitzada* (Barcelona: Publicacions de l'Abadia de Montserrat, 2006).

unions which had taken the initiative in the organization of work and the economy during what Hans Magnus Enzensberger called the "brief summer of Anarchy."[61]

(Fig. 3 here)

Some months later, on March 18th 1937, the next president of the Department of Economy, the anarcho-syndicalist Diego Abad de Santillán, signed the governmental order to create the Technology Museum of Catalonia. The text of the order argued for "the need to provide the people with institutions that let them know the industrial development of the world" on the grounds that Catalonia was "a country that makes its living primarily out of industry." The new museum was envisioned as having "a pedagogic interest as well as a great technical industrial interest" as it was considered to be a complement to the existing network of vocational schools run by the Department of Culture. In addition to gathering all the material that could be an "expression of the past," the museum was also supposed to "show the paths opened to industrial progress" and to point to the "possibilities of the future."[62]

A steering committee in charge of the creation of the museum was established. The committee was exclusively formed by engineers and technicians from the most relevant technological schools and institutions in Catalonia (among them Santiago Rubió, at that time director of the Barcelona School of Industrial Engineering).[63] It was chaired

[61] Hans Magnus Enzensberger, *El corto verano de la anarquía: Vida y muerte de Buenaventura Durruti* (Barcelona, Grijalbo, 1975 [1972]) (original title: *Der kurze Sommer der Anarchie: Buenaventura Durrutis Leben und Tod)*. On the role of engineers and technicians in labor unions, in industries and in the "economic war" during the Spanish Civil War, see: Antoni Castells Duran, *Desarrollo y significado del proceso estatizador en la experiencia colectivista catalana, 1936-1939* (Madrid: Nossa y Jara, 1996); Antoni Castells Duran, "Revolution and Collectivizations in Civil War Barcelona, 1936-1939," in *Red Barcelona:++ Social Protest and Labor Mobilization in the Twentieth Century*, edited by Angel Smith (London and New York: Routledge, 2002), pp. 127-141; Michael Seidman, "Work and Revolution: Workers' Control in Barcelona in the Spanish Civil War, 1936-38," *Journal of Contemporary History*, 1982, 17(3):409-433.

[62] "Ordre que crea" (cit. note 5).

[63] The steering committee was formed by the Directors (or designated representatives) of the General Laboratory for Testing and Research (*Laboratori d'Assaigs i d'Investigació*), the School of Industrial Engineering (*Escola d'Enginyers Industrials*), the School of Agriculture (*Escola d'Agricultura*), the

by a member of the Permanent Industry Committee, a selected group of four industrial engineers directing the Industrial Services of Catalonia, which in turn depended on the Department of Economy. The steering committee was commissioned to submit an official report within the following thirty days, and created to this end fourteen specialized commissions to survey all the industrial branches of the country. On June 12th, the report had not been written yet, and the members of the commissions received an official communication urging them to "do all your best" to submit a "detailed proposal of the machines, artefacts, tools and other exhibits that are considered interesting to be displayed in the Museum" before the next meeting of the steering committee, scheduled for June 18th.[64]

The Technology Museum of Catalonia merged the two approaches to the musealization of technology we have seen so far: the tradition of technological display aimed at increasing productivity and improving technical education, on the one hand; and the musealization of technology aimed at building a technological past and at putting engineers in the symbolic core of the nation, on the other. We will deal with them in turn.

The proposal for the creation of the Technology Museum of Catalonia fitted within the economic and educational policies of the Department of Economy. After the outbreak of the war, this Department had taken responsibility for fighting in the so-called "economic front" (through the creation of a new socio-economic order) and in the so-called "cultural front" (through the promotion of popular education).[65] These two "fronts" had to pursue the goal of consolidating the revolutionary conquests while ensuring victory in the war front. In this context, the Technology Museum of Catalonia was conceived as

Industrial School (*Escola Industrial*) and the School of Work (*Escola del Treball*). Three students from each of the institutions were also supposed to be recruited to help in the work of the steering committee.
[64] From this date on, the historical records are silent and there is no evidence of further preparatory work.
[65] See, for instance: *Butlletí trimestral de la Conselleria d'Economia*, 1936, 1, p. 24.

a tool for enhancing war production and maximizing industrial efficiency, which became an even more urgent need once the European democratic governments decided to abide by the international Non-Intervention Agreement (signed in August 1936) and denied any commercial, financial and military aid to the Spanish Republic (despite the fact that Hitler and Mussolini were decisively supporting the fascist forces). At the same time, the museum was conceived as an instrument (among others) for tightening the collaboration between technicians and workers and advancing towards a "state of efficiency" which no Capitalist country had yet attained, and which was central in the conception of the revolutionary economy shared by Diego Abad de Santillán and many engineers in the government.[66]

It is not by chance that the design of the Technology Museum of Catalonia was commissioned to the high-rank professionals of technology that were also engineering both the war and the social revolution.[67] The members in charge of the organization of the museum headed some of the laboratories, training schools and expert committes that were already serving the government as consultant institutions or actively participating in the war research: the General Laboratory for Testing and Research, for example, had been more busy than ever testing materials and procedures to support the war industries and the civil defense;[68] the School of Industrial Engineering, through its Chemical Analysis Laboratory, tried to develop new fuels and weapons (despite the efforts of some fifth columnist teachers and technicians who attempted to sabotage or slow down this

[66] Diego Abad de Santillán, *Por qué perdimos la guerra: Una contribución a la historia de la tragedia española* (Madrid: G. del Toro, 1975), pp. 101-125 (quote in p. 103). See also: Diego Abad de Santillán, *El organismo económico de la revolución: Cómo vivimos y cómo podríamos vivir en España* (Barcelona: Tierra y Libertad, 1936).
[67] Valentines-Álvarez, "Engineering the Social Revolution" (cit. note 59).
[68] The franctic activity of the Laboratory during the war is reflected in the huge amount of request orders, test budgets and test certificates (35 boxes), which are preserved at the ANC (ANC1-82, Laboratori General d'Assaigs i Investigació). "Els laboratoris de l'Escola Industrial (1936-1939): Guerra i depuració," 2005-AREM-10016 Project Final Report, Centre de Recerca per a la Història de la Tècnica, 2007.

research);[69] and Santiago Rubió himself was also in charge of the organization of the Conference for the Industrial Exploitation of the Natural Resources in Catalonia (CAIRN), an ambitious official project to scientifically survey and manage the whole nation in order to strengthen its economy, reduce imports of raw materials and avoid dependence on foreign technology and technicians.[70]

The emphasis on industrial productivity, efficiency and research was also reflected in the fact that the museum was to include an "Office of Technical and Industrial Information" and an "Office of Small Inventions." The official order explicitly stated that the focus of the Technology Museum of Catalonia should not be on artefacts that "provoke a transformation and sometimes a revolution in industry," but on smaller improvements in industrial procedures, or new methods of production, which had to be stimulated through the organization of exhibitions and prizes for the most useful innovations.[71] As in the case of the Technotheca (which also intended to include this kind of offices and contests, as we have seen), the Technology Museum of Catalonia was geared towards the "battles of production and consumption," but these included now real military battles to death.

Besides the goal of increasing productivity by displaying new inventions, the Technology Museum of Catalonia was also to display old machines in order to show "the technical progress of our industry."[72] The past, however, was to be presented through the lenses of the present. In Svante Lindqvist's terms, the historical narrative would have been a contempocentric one, since the museum was structured according to the industrial

[69] Francisco J. de Madariaga Fernández, Las industrias de guerra de Cataluña durante la Guerra Civil (PhD Diss., Universitat Rovira i Virgili, 2005), pp. 653-661; Lusa-Monforte, "La Escuela de Ingenieros en Guerra" (cit. note 17), pp. 48-65.
[70] *CAIRN: Conferència de l'Aprofitament Industrial de les Riqueses Naturals de Catalunya* (Barcelona: Conselleria d'Economia, 1937); *CAIRN: Reglament* (Barcelona: Conselleria d'Economia, 1937).
[71] "Ordre que crea" (cit. note 5).
[72] *Ibid*.

sectors that were officially sanctioned at that time.[73] Since the Catalan home rule was approved in the Fall of 1932, the main engineering professional association had lobbied for institutions commissioned to define a new industrial organization of the country. In 1934, their efforts led to the creation of the abovementioned Industrial Services of Catalonia within the Department of Economy.[74] The task of this new institution was to advise on government and legislative actions aimed at implementing a rationalized planning of the Catalan private and public industrial initiatives, through statistics, industrial census, expert reports, scientific conferences, and even exhibitions.[75] During the war, the Industrial Services of Catalonia, approved a new "industrial classification," which divided industry in fourteen branches. The creation of fourteen specialized commissions by the steering committee to define the contents of the museum, one for each branch of industry, points to the fact that the Technology Museum of Catalonia would have been organized as a mirror image of the organization of the Catalan industry that engineers had been lobbying for throughout the 1930s, and had finally achieved to implement.[76]

We don't know whether Santiago Rubió would have suggested to include a contextualist approach, as he had done in the case of the Catalan forge some years before, or the museum would have favored sequential and artefact-centered chronological arrangements of machines. In any case, the museum's historical narrative would have

[73] Lindqvist, "An Olympic Stadium of Technology" (cit. note 8).
[74] "Ordre creant una ponència per a la redacció d'un avantprojecte d'estructuració i ordenació dels serveis d'indústria...," *DOGC*, II:I:19, p. 300; "Actes de la Junta Directiva," 01/02/1934, AhEIB.
[75] *Normes generals d'estructuració i ordenació dels serveis d'indústria a Catalunya* (Barcelona: Departament d'Economia i Agricultura, 1934).
[76] The museum would have thus been divided according to the following typology of industrial branches: Lubricants and fuel industries (I); machine and metal production (II); textile industry (III); food industry (IV); farming industry (V); chemical industry (VI); construction industry (VII); graphic arts (VIII); transportation (IX); gas and electricity (X); communications (XI); irrigation (XII); hygiene and health (XIII); commerce, credit and insurance (XIV). Santiago Rubió was in charge of four commissions: VII, IX, XI and XIII (*Classificació industrial establerta per decret del 26 de desembre de 1936 i complementada pel Departament Tècnic d'Indústria* (Barcelona: Conselleria d'Economia, 1937)).

added the technological past to the museological construction of national identity. The Technology Museum of Catalonia had to join and complement the three existing national museums displaying the different "souls" of the nation: the already mentioned Art Museum of Catalonia and Archaeology Museum of Catalonia, in the Montjuïc hill, and the recently inaugurated Maritime Museum of Catalonia, located in the impressive Gothic buildings of the old medieval shipyards.[77] Technology would have finally been included in the official representations of Catalan identity and history: the 6th century BC ancient marbles of the coastal Greek colony of Empúries, the 12th century frescoes of the Romanesque churches in the Pyrenees, and the ships of the 14th-century Catalan maritime dominance in the Mediterranean Sea would have met with the dynamos and the turbines that powered the textile factories in the 19th and the 20th centuries as a material expression of the nation on display.

Concluding remarks

As in other European and North-American cities during the interwar period, engineers were behind the proposals for creating a large, public and permanent museum of technology in Barcelona. Unlike in other places, however, Catalan engineers failed to implement their heterogeneous museological proposals at least three times: the Technotheca in 1929, the display of the Catalan forge between 1930 and 1936, and the Technology Museum of Catalonia in 1937. Despite of the fact that the engineering profession and the technocratic discourses increasingly permeated politics from left-wing to right-wing during the Second Spanish Republic, the nation-building museological

[77] The Maritime Museum of Catalonia was officially created in October 1936, after being especially promoted by the *Institut Nàutic del Mediterrani* since 1931. "Decret en virtud del qual les naus...," *DOGC*, 1936, IV:IV:296, p. 299; "El Marítim entre bombes," museographical script, 18/05/2009, Arxiu General del Museu Marítim de Barcelona.

policies mainly relied on museums of fine arts, archaeology and maritime history.[78] High-rank engineers did not oppose to it, on the contrary. In general, they shared the symbolic (and spatial) world of the Catalan bourgeoisie, and also searched for other more classical "souls" of the nation in history, art or language. Santiago Rubió, for example, put his philological and architectural researches in the Pyrenees at the same level of the musealization of the Catalan forge.[79] And at the same time that some engineers were planning the Technology Museum of Catalonia and putting gears, tools, steam and smoke at the core of the nation, others hurried up to preserve the artistic heritage of Catalonia from the air-raid bombings.[80] Engineers Carles Pi Sunyer and Ramon Perera, who were respectively in charge of the Department of Culture of the Catalan government and the Shelter Services of the Catalonia Board of Civil Defense, led the tasks of protecting the façade of the Cathedral of Tarragona and other "non-technological" heritage landmarks in Catalonia.[81]

[78] Another example in this line is the Spanish Pavilion at the 1937 Paris World Fair, in the design of which the Catalan Department of Culture and its Propaganda Office had played a critical role. There, artistic expressions such as medieval frescoes or Picasso's *Guernica* took preeminence over the display of "modern" or "forgotten" technologies. Art seemed to the authorities to be more suitable to denounce the air-raid bombings, express the Republic's commitment to peace, and call for international aid. On the 1937 Spanish Pavilion, see: Catherine Blanton Freedberg, *The Spanish Pavilion of the Paris World's Fair* (New York and London: Garland Publishing, 1986), pp. 123-125 and 140-146; *Pabellón Español: Exposición Internacional de París, 1937* (Madrid: Centro de Arte Reina Sofía, 1987). On the nationalist belligerence at the exhibition and the megalomaniac Soviet and Nazi pavilions, see: James Herbert, *Paris 1937: Worlds on Exhibition* (Ithaca: Cornell University Press, 1998).

[79] Valentines-Álvarez, "The Quest for the Technological Soul of the Nation" (cit. note 44).

[80] In 1938, a set of decrees regulating the protection of "scientific heritage" (alongside with "historic" and "artistic" heritage) were passed for the first time in Catalonia ("Decret que reglamenta la defensa del Patrimoni Històric Artístic i Científic de Catalunya," *DOGC*, 1938, VI:I:8, pp. 89-90). Even though the head of the Department of Culture, engineer Carles Pi Sunyer, had vindicated the Catalan forge and other "Catalan inventions" as national icons, it is worth to mention that "scientific heritage" mainly referred in these laws to paleontology and the natural sciences. Mercè Gracia Sánchez, *Les polítiques de salvaguarda del patrimoni cultural a Catalunya: De la Guerra Civil a la Postguerra, 1936-1943* (Barcelona: Universitat de Barcelona, 2016).

[81] Jaume Massó Carballido, *Patrimoni en perill: Notes sobre la salvaguarda dels béns culturals durant la guerra civil i la postguerra (1936-1948)* (Reus: Edicions del Centre de Lectura, 2004), pp. 107-112; Guillermo Lusa-Monforte, Antoni Roca-Rosell, Jaume Valentines-Álvarez (eds.), *El Fons "Ramon Perera": Imatges de la defensa passiva a Catalunya (1938-1939)* (Barcelona: Càtedra UNESCO de Tècnica i Cultura, 2008), p. 21. See also: Carles Pi-Sunyer, *La República y la Guerra: Memorias de un político catalán* (Mexico D.F.: Oasis, 1975), pp. 547-562.

Nonetheless, we have seen how technology was important enough to deserve the official impulse of the Technology Museum of Catalonia during the Civil War. This impulse was clearly related to the prominent role of engineers during the conflict, and was to serve two politically transversal ideologies at the core of their professional program: the technocratic ideals of rationalizing the economy, boosting efficient productivity and scientifically managing the nation, on the one hand; and the techno-nationalist will to create a technological past for the nation and a national place of honor for the profession, on the other. In this sense, the Technology Museum of Catalonia was heir to two long traditions of technological display promoted by engineers. Firstly, its orientation towards enhancing production, organizing the industrial sector and improving technological education was connected to the displays at the former engineering schools' museums, the commercial museums, the trade fairs and the projected Technotheca. In the midst of a huge mobilization of human and material resources to defeat fascism, the museum was envisioned as another potential tool to win the so-called "battles of production," and eventually the war. Secondly, the techno-nationalist character of the Technology Museum of Catalonia was indebted to the former proposals of making past technologies and small inventions a central element of national identity, just as in the case of the musealization of the Catalan forge.

We will never know whether the museum would have been created if the war had ended differently, nor the exact reasons for the delay in the preparatory work in 1937.[82]

[82] One of the many imaginable reasons for the delay is the fact that many of the students and junior staff which participated in the works of the museum commissions were conscripted during the following months. This was the case, for example, of Jaume Mayol, a student at the School of Industrial Engineering. After having collaborated with Santiago Rubió in the VII commission, he was recruited and became lieutenant of the Spanish Republic army. In fact, the order of 1937 stated that every commission could have the collaboration of several students as long as this did not mean "an exception of the regulations of the Department of Defense concerning the recruitment of troops." "Ordre que crea" (cit. note 5), p. 1264; "Necrológicas," *La Vanguardia*, February 26th 2008, p. 34. We are grateful to Guillermo Lusa-Monforte for this information.

But the case is that the Technology Museum of Catalonia could never be put at the service of national industry nor national identity. After the Civil War and the suppression of the Catalan government by the dictatorship, the project fell into oblivion, while the existing national museums were compelled to change their scope into a local or regional framework, as shown by their new official names, in which the word "Barcelona" replaced "Catalonia." It was only after Franco's death in 1975, in the context of massive demonstrations for the recovery of democracy and the Catalan home rule, that Catalan engineers turned again to the musealization of technology. In 1976, they started pushing for the establishment of a new Museum of Science and Industry of Catalonia.[83] During the promotional campaign, the attempt to create the Technology Museum of Catalonia in 1937 under the bombs was brought back to light to invoke the continuity with a Republican project that the fascist victory had aborted.[84] This time the proposal did not go up in smoke, and the museum was finally inaugurated in 1984. The failure of the Technology Museum of Catalonia in the 1930s had a rhetorical role in this professional success of the 1970s. Forty years separated both endeavours, and the contexts were actually very different, but in both cases the musealization of technology was at the intersection of politics, the profession and the nation.

[83] The Barcelona Association of Industrial Engineers created the Association of the Science and Technology Museum and of Industrial Archaeology (*Associació del Museu de la Ciència i de la Tècnica i d'Arqueologia Industrial*, AMCTAIC, 1979), which became part of a widespread movement for promoting industrial archaeology and preserving industrial heritage in Catalonia. See: Antoni Roca-Rosell, "Musées, technique et identité culturelle: L'exemple catalan," *Alliage*, 2003, 50-51:151-164.

[84] "Per un Museu de la Ciència i de la Tècnica de Catalunya," *Novatecnia. Publicación de la Asociación de Ingenieros Industriales, Agrupación Cataluña*, 1977, 2:22-26. See also the historical section of the website of the mNACTEC: <http://mnactec.cat/en/the-museum/the-mnactec-detail/history> (accessed 11 March 2018).