ENGLISH

English translation by Paula Olmos

Hermann Jansen and the 1929 Madrid Contest

Carlos Sambricio

The contest organized in 1930 for Madrid's Expansion Plan and won by Secundino Zuazo and the German architect Hermann Jansen raises the question about the exact contribution of each one to the winning project. For years, the German critics who wrote about Jansen did not even mention Zuazo's name in relation to the competition. In the same way, the Spanish tried to avoid any credit due to the German architect and it was even assumed that Jansen's contribution was rather questionable. We really do not know much about the two visits Jansen made to Madrid in those days (one to take a look at the site and the second one to get the prize) but, on the other hand, nobody seems to have shown the slightest interest in the several German architects Jansen sent to Zuazo's studio in Madrid or about the drawings he sent Zuazo from Berlin.

Jansen's personality was rather different from Zuazo's: he was Henrici's disciple in Aachen and belonged to a generation just between that of Sitte, Brix, Eberstadt, Baumeister, Goeckes, Fischer and Sttüben (the fathers of the urban science at the end of the late century) and that of the architects who, during the twenties, took the responsability of the social housing policy in the Weimar Republic as "Stadt-baurat" or "Consultants for the city construction", encouraged by the workers' cooperatives as the GEHAG or just by the city's Social Democrat government. After winning the contest for the Great Berlin Plan in 1910 he realized (from 1910 to 1930) several masterplans for specific parts of the city as municipal planner (Tiergarten, Tegel, Zehlendorf, Wedding...) and became somewhat renowned outside Germany by making plans for Praga, Ankara and Stockholm. Finally, as editor of the "Der Baumeister" magazine, he revealed his profound knowledge about the problems of German urban planning in those days.

During the thirties, Secundino Zuazo was considered in Madrid (together with Leopoldo Torres Balbás, Moreno Villa and Gustavo Fernández Balbuena) one of the masters of the younger generation of architects: he had had an important role in the polemics about the classicist language and the Rationalistic housing and, from 1920 tc 1927, he realized some modern and innovative proposals for Seville, Bilbao and Zaragoza which he developed together with Manuel Mañas, an attorney working for Madrid's Town Hall and who was an expert in real estate management. Side by side with the "architect" Zuazo we always find the "urban administrator" Mañas, as a result of the increasingly significant urban science emerging in Madrid during that period. The fathers of this urban movement were, on one hand, Adolfo Posada and the people belonging to the Municipal Institute for Social Reform and, on the other, some of Maura´s supporters as Calvo Sotelo, in the beginning and García Cortés. Their labour was lately followed by Gascón y Marín, a municipal planner completely disregarded by the Histories of urban planning and who, nevertheless, played a significant role in Madrid´s development between 1940 and 1950.

The Project for Bilbao´s Renovation, made by both in 1920 was somewhat based in previous proposals by Guimon, on one hand, and Alzola and Achucarro on the other, but it included areas of high-rise construction as a solution to the housing problem, something promoted by the German urban planning of those years. In this way the resulting appreciation of the land would benefit the town hall that would, thus, have money enough to undertake the project. This partnership was maintained in Seville and Zaragoza plans. The issue of municipal fund-raising that would enable town halls to undertake urban projects was exposed by Mañas in a discussion held with Mauricio Jalvo during the 1923 Building Conference. He defended the idea of creating a Municipal Bank and establish a new policy of land acquisition in the city suburbs.

The first event which showed the influence of German urban planning in Spain was the 1926 Congress of Urban Design in which Balbuena, Zuazo, Lacasa, Sanchez Arcas and others acted as organizers. The contributions were diverse enough. Some, like Cort, Yarnoz and Gallego represented the 19th century tradition and supported the Municipal Statute promoted by Primo de Ribera's Dictatorship (some of them were even the authors of this regulation). But at the same time Balbuena talked about City Organization, Zuazo about Reform in town centres, Colás about Urban Planning in modern cities, Llopart (together with Rubio i Tuduri) outlined the idea of the County or Regional Plans, Sánchez Arcas talked about Characteristics of the streets in relation to the buildings in them and Lacasa explained the Urban plans in Germany, pointing out how the issue of Metropolitan reformation versus Suburban Development was then a current one in Europe.

Zuazo had a significant role during that period, not just because of his architectural labour but also because he participated actively in real urban planning. He was capable of combining a serious concern about management issues with an architectural taste in the construction of the city. His project were therefore among the most important and relevant. In Bilbao he tried to solve the problem of town addition by establishing growth patterns; in Seville he supported the idea of building beyond the city traditional limits designing an expansion area; and in Zaragoza he enlarged the city's main axis (Independence Walk) towards the Ebro river, establishing a new policy relating land management and housing development.

What could be therefore the reason for Jansen's presence in Madrid's contest when Zuazo was already working in an environment clearly conscious about urban planning? Why, moreover, an older German master belonging to the late generation instead of one of those young Social Democrats who were precisely then (as official urban planners) changing the appearance of the German towns? And why a German citizen instead of someone like Le Corbusier or any other one related to the newly created CIAM?

I have in other works talked about the influence of German urban planning in Madrid's architects during the period between 1925 and 1936. I will reveal now a new fact, a strangely learned one, that will corroborate my idea. Revising the subscriptions to the German magazines of architecture and urban design between 1931 and 1933, one may find surprising data. For example, in 1931 France received 315 subscriptions to "Moderne Bauformen" (385 in 1933) and United Kingdom, 60 (56 in 1933), while in Spain the number increased spectacularly from 170 in 1931 to 431 in 1933. In just two years, the Spanish Republic trebled the number of subscriptions reaching a total number just similar to that of Fascist Italy in a period in which this was just due to political affinity as Hitler had gained power in 1933 and the magazine was being used for propagandist purposes.

This is not just an anecdote if we take in account that the number of architects in Spain in 1933 was not much higher than the mentioned subscriptions. Many of them were surly received by official documentary services, town halls, libraries... and I think that the conclusion could be that the German influence appeared in a really definite period, probably due to the significance of the CIAM congresses.

In order to study this influence we should take in account many particular issues and analyze it from different points of view: When did the first contacts take place and how were them? When did the Spanish architects first heard about the German experience and, on the other hand, what did German architects know about Spain? Was this German influence a common phenomenon in the different cultural centres of the period (Barcelona, Seville, Bilbao, Valencia and Madrid)? How were this new methods received in the mentioned places? Were the issues discussed by the German really new for Spanish architects or did it exist any previous concern? To what extent did the criticism towards the idea of the Metropolis ventured by the supporters of the "Heimatschutsbewegung" (Movement for the Defence of Vernacular Culture) had any sense in Spain during that period?

We should try to understand how Spain could, during the years of the First World War, forsake the nostalgic Regionalism (Ortega´s despised Sevillanism for example) and began to think about the sense of tradition and the immutable things, about the people´s spirit (Volk-geist); point out the significant role played by the Institute for Free Education, with its studies on rural architecture and its Artistic Missions, in the diffusion of the new architecture; establish the importance of the Hygienist studies in the renovation of the cities; find out to what extent the municipal regulations began to include new ordinances about the buildings´ height, density and volume; notice the different approach in the criticism against the concept of the Metropolis in people like Azorín and Baroja, on one hand, and Torrás i Bages, the disciples of Donoso Cortés and Repullés (who defended the rural culture against the growth of the metropolis conceived as a Grab des Proletariat or "Grave of Proletarians") and even those who in 1904 discussed about the convenience of building workers´ districts, on the other; analyze how the different proposals for ring shaped railways linking the different satellite nuclei around the city were really based on the German concept of GrossStadt. And in all these different issues we will notice how the German influence was not something new in the thirties as it had begun around 1910 (specially thanks to the role played by Ortega y Gasset, to the particular training received by the municipal planners under the patronage of Adolfo Posada and to the grants created by the Commission for Further Education...) and that there were important contacts which have not yet been studied.

Leaving aside the significant presence of young German architects in Madrid's Students' Residency, who, no doubt, transmitted their own ideas and conceptions, and even the impact of Mies' project for Barcelona, or the one by Behrens always ignored by Catalan historians, or Mendelson's complex for the Alba Family (who also owned a country house by Luthyens), I think that the German influence can be analyzed as including two different aspects: on one hand it was the Spanish architects who approached Germany in search of a theoretical framework and not the other way around; on the other, the real influence was not that of the youngsters from Weimar but that of the older urban planners from the Wilhelm's period (Stübben, Jansen...) who participated in competitions and collaborated with Spanish architects.

What was the reason why the only foreigners with some influence in Spanish architecture were the Germans? And why did

they concentrated in Madrid? I have already maintained in some other works that in those years Madrid's cultural world leaned to Germany (as a consequence of Ortega's influence) while Catalonia (under the patronage of D'Ors) was more interested in the definition of a Mediterranean culture, looking for French and Italian references.

Urioste, Canosa and Bassegoda based their work on Sitte, talking about the character of medieval cities and about the curved or straight running of the streets, etc... At the same time, Balbuena, Torres Balbás and Talavera studied and promoted the local traditional architecture (we also have to place within the same context the Didactic Missions of the Institute for Free Education related to the Movement for the preservation of the local mother country or Heimatschutzsbewegung) with a spirit fairly similar to that of Werner March and Jürgens in their studies on Spanish towns and to the works by Fischer, Schumacher and Schmitthener...

I think then that we should revise the assumed history of our recent architecture trying to include a more explicit reference to the discussions held in Germany. We acted as a Periphery, assuming the ideas emerged from the Centre. Imported concepts as avant-garde, housing studies, debate about architectural language, or about urban form, were assimilated around 1918 when the main discussion in Spain was held by the supporters of the different styles ("Montañés", "Plateresco", "Pseud-Sevillista") against those who promoted the study of tradition and rural art as the basis for a new architecture. Two other interesting facts: a) the young architects who graduated in Madrid between 1920 and 1925 (a period of economic boom according to García Delgado but a time of crisis for Weimar) organized graduate trips to Germany. b) The old German masters of urban design began to participate in the architectural contests for Bilbao, Seville and Madrid.

These old masters had been replaced by the younger generation in the municipal posts and began to look for other places to work. They discovered the so far ignored Spain (they just knew about it from the Jürgens' studies). In fact, Hegemann's Catalogue of the Berlin Exhibition in 1910 did not include any allusion to Spanish urban planning, passing over Barcelona's expansion project as well as over Arturo Soria's Linear City in Madrid. I think in fact that it was just for monetary reasons that the German urban planners began to participate in the contests for Seville, Bilbao and Madrid. The names of Stübben, Jansen or Czequelius in association with people like Fernández Quintanilla, Bastida, Bellido, Zuazo or Balbuena became something rather familiar in Spain.

The younger generation of architects in Madrid was rather influenced by the older one regarding this German connection. They began to travel to Germany with grants given by the Commission for Further Education as, just after the war, the German minister of foreign affairs taking advantage of Spain's neutrality during the conflict had tried to promote the relations between the two countries, creating a kind of cultural axis. Lacasa, Sánchez Arcas, García Mercadal, Pérez Mínguez, Colás and Jiménez were among the young architects travelling to Germany to study not precisely the "Neue Sachlichkeit" but the urban theory they have heard about in Spain. In this way Lacasa collaborated with P. Wolf in the reconstruction project for Dresden, Colás worked in the Bauhaus, Mercadal attended Charlotenburg's Seminar on Urban Design, in Berlin, which was organized by Jansen and collaborated with Poelzig in several projects and Pérez Mínguez attended Max Taut's courses and worked with Martin Wagner in Berlin's town hall. These examples, together with the presence of Taut, May, Hilberseimer, Bonatz, Wagner and Gropius in the Spanish magazines, show how Madrid's urban design had close contacts with the German reality.

This can explain why in 1924, besides having Gropius and Mendelson in Madrid's Students' Residency giving some lectures about their own architecture, Balbuena and Lacasa conceived the idea of creating a School of Urban Design similar to Harvard's "School of Landscape", Liverpool's "Town Planning School", Berlin's "Seminari für Stadtebau" or "L'Ecole d'Etudes Urbaines" founded by Marcel Poëte in Paris.

The mentioned International Contest published a magnificent dossier called "Information about the city" and written by Fernández Quintanilla, in collaboration with Giner de los Ríos, which analyzed the historical and geographical development of the city, the characteristics of its traffic, circumstances about the lack of housing facilities, distribution of retail services, etc... The text, which included the competition rules, focused on two significant issues: the necessity of defining a zoning plan for the city and the purpose of building at last one of the old proposals made by Fernández de los Ríos, Núñez Granes and Salaberry, a great North-South axis linking the Manzanares river and the area of Chamartín as one of Madrid's main problems was the lack of clear railway junctions. The idea of creating a ring shaped railway as the main element for a new Regional Plan became also a fundamental issue.

The organizers of the Competition received twelve projects made by foreign practices (most of them German and French) and three made by joint teams of Spaniards and foreigners. Six of these projects were selected. In that same year of 1929 the Second CIAM Congress took place and Mercadal asked some Spanish architects as Izpurúa, Laballen, Cort, Rivas Eulate, Zabala, Zuazo, Sert, Illescas, Torres Clavé, Lacasa and Amós Salvador to send contributions with ideas about the city growth and development. At the same time, with the "Casa de las Flores" already built, Zuazo was designing a housing area just by the old Bullring (between the district of Fuente del Berro and Narváez street) including 329 low-income dwellings in thirty blocks, a marketplace, a library, gardens, etc...

How was then possible for Zuazo and Jansen, with so different careers and in such different periods of their lives, to collaborate in the project for Madrid? García Mercadal seems to have been their link. He stayed for a period in Berlin (also in Rome, Vienna and Paris) and came back to Madrid in 1926. He worked as Secretary for the "Arquitectura" magazine and published some studies by Jansen on urban issues and also translated and published a work by Otto Bünz about the Regional Plan. He was also a permanent collaborator in Zuazo's practice and it was him that introduced both architects. When the Competition was presented, Jansen asked Mercadal to select for him an expert on urban issues. Mercadal immediately thought about Zuazo, who was not very interested in participating in the contest as he disagreed with the competition goals. But Mercadal did never make clear how was this collaboration between both, what was the German's real contribution or which was Zuazo's role during the project. We have just a brief note about the first trip Jansen made to Madrid and we know very little (despite a rather confusing paragraph published in "La Vanguardia", a Barcelona newspaper, in 1931) about what happened after the competition and why Zuazo decided to continue alone with the project. It is difficult to know what was made by each of them. To say that the "contribution of the German master is somewhat doubtful" as some have affirmed is really pointless. It just makes no sense that Jansen should take so much trouble in finding a good partner, travel to Madrid to examine the site... and then neglect his work and permit others to use his name. It would also be rather absurd to think that Zuazo, who did not want to participate, should accept his doing all the work, share with Jansen the project's authorship and then, once the contest won, should abandon the German and continue alone with the issue. There is a fundamental fact that we should not forget: both were most celebrated authorities in their respective countries and both tried afterwards to revindicate their own particular labour while concealing or minimizing each other's contribution. Therefore, the only way to analyze the part of each architect in Madrid's project is to compare the contest documents with previous ideas and conceptions an examine Zuazo's and Jansen's archives in search of relevant documentation.

Leaving aside the Mercadal link, I think that both had similar previous experiences. Jansen worked from 1927 to 1930 in the reconstruction of Berlin districts. In 1927 he realized four projects for garden-cities in Pomedia, a garden city in Treptow and a Sidlung in Schleste; during 1928 he continued working on garden cities and in 1930 he presented a proposal for the reform of Munster's historical centre. In all these projects he showed his capacity as a designer and his interest in certain urban issues like zoning, for example. He was always in favour of dividing the city into different functional areas. In this sense the principles applied in Madrid's project, the idea of the Castellana walk as a significant axis, the creation of new satellite towns making a ring around the main one and even the new way to understand the reformation of the city centre were issues already present in Jansen's work. But, if we take now the idea of the parallel blocks of different height (and for different social classes) we should point out that, though being a German like solution, it had already been used by Zuazo in Bilbao and Seville. The projects for Zaragoza and Seville included, moreover, a proposal for the urban organization of the suburbs and the idea of a Regional Plan was present in (was in fact the main basis of) Bilbao's plan.

With the assistance of the "Kunstwissenschaft Institut" of Berlin's Architecture TU, I have been able to find in Jansen's "Plansammlung" an important collection of original drawings among which three examples which are really relevant for our present issue. The first one, signed by Jansen himself in 1930, includes a zoning study for Madrid which defines new industrial centres and housing developments, the road network with its new streets and green areas, establishing, besides, relationships between the new satellite districts and the ring shaped railway. There is a green area surrounding the whole city and limiting its future growth, something similar to the concept used in the 1910 Berlin Competition. Public green areas are clearly differentiated from private ones. The East front of the city is occupied by Garden cities or districts and finally the Castellana axis with its isolated high-rise blocks is not conceived as a housing area but, as lately assumed by the Bidagor Plan, as "Regierungvirte" or representative and administrative district.

Jansen's drawing is undoubtedly a working document. It is made on a 40x40 cm. tracing paper and it must have been the original drawing of the proposal sent to Madrid, to Zuazo's practice, to be revised, studied and modified if necessary and handed to the Town Hall with the rest of the documents

There is in it something new which was not present in the 1923 and 1926 proposals: the city can grow along expansion areas from the Manzanares River towards Carabanchel, creating an axis (almost an industrial linear city) which would rearrange Madrid´s industrial area.

The second drawing found in the "Plansammlung" contains two types of proposals. On one hand, we have seven specific projects: Chamartín Railway Station, the Hippodrome and Public Baths near Puerta de Hierro, the organization of the Castellana Walk with the parallel high-rise blocks, the plan for the University City, the reform plan of the Royal Palace´s surrounding area, the modification of the limits of the Retiro Park and the creation, near the old Arganda Railway Station, (between Ibiza, Menéndez Pelayo and Doctor Esquerdo) of an undefined green area which should include entertainment and sports facilities rather similar to that proposed for the city´s Northeast area and finally called "The Abroñigal Great Sports Field".

On the other, we find five urban operations intended to change completely the city appearance: the development of the North-South axis; the preservation of the garden-cities along the Dehesa de la Villa, the Extremadura Walk and La Estrella District; the prolongation of the grid established by the Expansion Plan towards the Prosperidad district; the creation of an East-West axis connecting the road to La Coruña, through Princesa, Gran Vía, O´Donell and Manuel Becerra towards Canillejas and the old Aragón road up to the Barcelona highway; and finally, what I think is the most important project, the development near the Pacifico area of a linear axis parallel to the Castellana walk with new streets, a system of green zones and a group of buildings intended to establish an outer boundary for the city trying to limit its growth towards the East. Surprisingly enough, this drawing was not included in the final dossier and I think that if we analyze the reasons why Zuazo rejected it we will understand much better how the team worked in terms of decision taking.

The third of Jansen´s drawings is dedicated to the detailed study of the prolongation of the Castellana Walk: the idea proposed by the German was completely assumed in the final dossier. It included the construction of two railway stations: one located towards the southern area of the Walk, conceived as a transport interchange for the railway linking Atocha and Chamartín; and the

second one, located to the North, that would be the future Chamartín Railway Station, the main station in the city´s railway system, an idea recovered from the old proposals of Soria´s Ring Shaped Railway and Grasset´s suggestions.

The plan, a small piece of tracing paper drawn with Indian ink, is signed by Jansen himself and is almost the same as the one handed with the dossier (which we have always considered Zuazo´s). The only real difference is the existence of a double green axis whose importance was minimized in the final plans. But the most important contrast between this drawing and Zuazo´s is the speculative character of the later as it replaces an important green area with a housing development of high-rise (high density) blocks which threatens the project´s equilibrium. It has been said that what Zuazo did was "replace some Functionalist blocks with others organized as paired blocks around an open court (the solution found in the "Casa de las Flores")" but this is incorrect.

The different criteria followed by the German and the Spanish architects can be distinguished by analyzing these two plans. And I think that the works dedicated to Zuazo so far published have in some way disguised the reality by using materials from different periods of the project under different circumstances. In the Memoirs published by the then Major of Madrid, the Marquis of Hoyos, there is not a word about these changes. Neither there is in the different monographic books published about the period. If the idea was to create a housing area why then the mentioned concept of the "Regierungviertel". Was it, by chance, a way to answer the Major's demand about the project's self financing? And, in this sense, was it a direct consequence of Mañas' influence? Had it anything to do with Zuazo's previous experience in the housing field?

There is a fourth drawing in the Berlin archive regarding Madrid's Competition and it consist of a detailed plan of one of Jansen's seven specific proposals: the Hippodrome to be built by the Manzanares River and not in the site lately chosen for its construction in 1931-32. Jansen's intention was to create a leisure area by the river bank including a swimming pool complex. The final dossier would relocate the hippodrome towards the Puerta de Hierro district and would contemplate a new piece within the existing complex (the Isla Swimming pool by Gutiérrez Soto and the Playa de Madrid complex by Muñoz Monasterio).

What was then Jansen's contribution to the Competition project? I think it is clear now that it was something else than just lending a name. To analyze the 1929 project as part of the flourishing Berlin urban culture can be very revealing. But it is even more important to discover how the influence of the German architect was to survive as, in later years, the Town Hall's Technical Bureau and, surprisingly enough, Bidagor after the Civil War would make use of certain suggestions present in Jansen's drawings.

NOTE

The present study has been possible thanks to the support offered by the German DAAD in collaboration with the Institut für Geschichtswissenschaft of Berlin's TU during the 1995 summer. I am specially indebted to Prof. Dr. Wolters for his precious suggestions and to the employees of the Universitätsbiblioteck Plansammlung for helping me to obtain copies of Jansen's drawings.

Uprooting and meeting, architecture in exile

Miguel Angel Baldellou

"The impressive exodus of 1939 was in some way a magnificent present offered by Spain to the world at the expense of suffering itself the gravest and most irreparable mutilation of its own substance"

Sáenz de la Calzada, 1978

The incipient process of modernization undertook within the Spanish architectural world in the mid twenties was abruptly interrupted by the Civil War after just a decade. The labour of the architects belonging to that "movement" had not been as remarkable as could have been expected, though, mainly due to their lack of an appropriate theoretical support for their own work and to the weakness of their convictions about Radical ideas.

I have in other articles tried to state how this fundamental weakness permitted many of those supposedly "Rationalist" architects to change their ideas after the end of the conflict. "Orthodox" critics assume that the abandonment of the previous positions can be explained just as a consequence of the ideological situation of the post-war period. It is obviously true that the ambience during the so called Autarky must have been, to a great extent, responsible for the sudden oblivion of those experiences (there were even conscious attempts to destroy their traces). But there was also another, though related, reason for all this as it was the actual disappearance of many of the most prestigious architects of the previous period, either victims of the war (as Aizpurúa and Torres) or just exiles.

The consequences of the Civil War for the world of architecture were rather significant. In 1941 (1), "Arquitectura" made a list with the deceased architects in the winning side: they were 42. We can suppose that those in the losers' side were about the same (2). If we count about 45 exiles (4), we would have more or less 150 architects who would not be available after the war, a rather high figure if we take in account the total number of architects in Spain.

And from the point of view of quality; those who have studied this issue have had no doubt in maintaining that their disappearance was really decisive in the post-war period. The absence of those who went in exile was really regrettable as well as the abandoned state of many of those who remained in Spain. We should think in some other occasion about this last group and their varied situations though we will try to deal now with the strict exiles.

In fact the architects punished after the war included not only many exiles but also those affected by temporary banishment or whose work was banned or in any case watched over (5).

According to Bohigas, most of the architects affected by the change produced works which did not belong to the European avant-garde: the exodus was so abundant and so sudden that the immediate consequence was the development of other currents which had been contemporary of our so called "real" Rationalism (6).

I sincerely think that if the political conditions of the post-war period had continued, the labour of our exile architects could not have been so significant. The way they reacted to their new situation revealed in most cases the weakness of their architectural ideals and their lack of commitment with avant-garde.

Of course we must speak differently of their political commitment to ideologies which went from Leftist Marxism to Liberal Democracy. The experience of the exiles was, undoubtedly, an example of human dignity and patriotism difficult to be excelled.

The words of Arturo Sáenz de la Calzada, one of the exile architects, explaining in 1978 how they had lived their fate were extremely precise: "Uprooted, stripped of their everyday context, their spiritual and emotional connections, humbled by their first misery, they had to build up a new life in a strange environment, trying to adapt themselves for better or for worse to their new circumstances. Some could accommodate themselves and replaced their unproductive melancholy with a new and prolific devotion. Others, on the contrary, could not bear the painful agony of detachment, and lived permanently in a provisional way trying to avoid any new contact, interest or link which could prevent their immediate return when time, distant and uncertain as it appeared, would come. These are the two extreme cases of a same process: banishment as inciter or as hindrance." (7)

The relationship established in the previous account between political ideals and formal avant-garde is obviously rather loose. In fact, it would be rather arbitrary to think about it otherwise.

There was an obvious rupture with previous developments in Spain, and just when the improvements seemed to be more solid. But, if exodus would not have taken place, would things have been very different? We will never know. Some time ago, my curiosity about these issues took me to study among other things the works of the exile architects outside Spain. The field was probably too vast not just because of the total number of architects (Giner´s list included 42) but also because of the diverse countries which had received them, from the whole American continent to several countries in Europe as Russia, Poland or even Norway. My conclusions were completely unexpected. First of all, it was almost impossible to identify as Spanish those works built outside Spain. We can think that this was just due to a conscious disregard for the site´s particular conditions as postulated by the International Style.

But these architectures were not more International than they were Spanish, at least if we take in account the Historians´ current definition of the term. Not all the exile architects belonged to the Modern Movement. There were, obviously, a few notorious exceptions as Sert, Bonet or Candela. And it seems that in most cases it was their new countries' particular conditions that influenced their architecture. We can even talk about a kind of mixture (a rather interesting issue for further research) between our architecture and that of the receiving countries, specially in Latin America.

This accommodation of the Spanish exile architecture to the local conditions reveals how the previous works, those undertook from 1925 to 1935 were also the result of a particular historical situation. We can even come to this conclusion by just studying the architectural "movement" during those years. The architecture realized in exile is particularly conscious of its own context. In any case, it seems difficult to place within a unique category. The supposed "convictions" were soon overpowered by the new situation. This happened abroad but we cannot say what would have happened to these architects in post-war Spain, where the atmosphere was not really appropriate for Rationalist experiments. It would have been rather difficult to recover pre-war tendencies. We have a good example of what I am saying in the works by Gutiérrez Soto among others.

In this sense the architecture of the exiles is somewhat disappointing. Bergamín, Lacasa, Sánchez Arcas, Martín Domínguez, Rodríguez Orgaz and Giner de los Ríos were not able to continue abroad what they had begin in Spain.

It happened with most of them though, there were, of course, some exceptions. Sert, Bonet and Candela are in my opinion outstanding examples of exiles who can be considered modern masters. Their labour was vital for architecture in Argentina, U.S.A. and Mexico. They could have been the post-war architectural animators.

Independently from the objective quality of their projects, their contribution was really appreciated in their countries of adoption. The prestige of European culture, of the particular architects we are talking about, of the Spanish Second Republic as a whole could have been the origin of the profound respect showed for our three architects. Our exile architecture had a magnificent precedent in the Republic´s Pavilion for the 1937 Paris International Exhibition realized by three of the architects which fled after the war: Lacasa and Sert on the board and Bonet on site. The temporary character of the proposal is like a presage of the subsequent dispersion.

The dispersion imposed by the exile and the critical situation of the expatriates was something clear in St. Cyprien Refugees´ Camp. Living on the beach in crowded conditions and surveyed by the French troops, they had to suffer subhuman treatment while waiting for their depart to different places from which many would not come back. The camp, realized by Robles Piquer, a refugee himself, was the first example of exile architecture. A urgent and ephemeral project like Paris Pavilion but even more significant as it was realized in much more demanding conditions. Hope was already lost and ideals untimely at that moment.

From that situation, an experience suffered by Candela himself, the Spanish architects, except for a few exceptions, had to

work hard for their lives in unfortunate conditions. Their architecture, scattered over many countries, remained disconnected and had to adapt itself to external demands. Although the circumstances made possible for some groups to gather in particular places this was not enough to create a unifying sense among them.

The exodus dispersed the common ideals, if they existed at all, and forced the architects to solve their problems with their own means, disconnected form the rest of their colleagues. Some had to become contractors (Candela) and others University teachers or even literary advisors (Lacasa). The exile architects had to play every possible role, many of them even unexpected and somewhat astonishing.

"Architecture in exile" is an expression that may seem somewhat fictitious. In fact, the different projects realized by the Spanish architects were varied and dispersed and generally speaking determined by adverse conditions. Any attempt to find common features in it would be sterile and useless.

The exile architects tried to integrate themselves within their new and strange contexts. This effort was probably too much for them. It consumed most of its energies. We cannot demand from them an excessive "commitment" to ideals that probably were never completely their own.

They succeeded in settling in new countries, which is something praiseworthy enough. Many decided not to come back and many could not at all for political reasons. They offered their new countries an acknowledged great capacity and were living examples of the moral strength inherited from their homeland. They became dignified personages. In many places, specially in Latin America, their friendship is still something highly estimated. They embodied the image of the defeated but not subjugated Spaniards. Clearly more admirable that the stereotypes trumpeted by propaganda. The humanistic approach of that somewhat frustrated generation (frustrated to a great extent by their own colleagues) was something to be remembered and a remarkable example compared with that of more favoured groups. In this sense, I think they should be admired and remembered beyond prejudice or resentment, architectural or others.

In any case, I would like to analyze the curious consequences of the exiles personal uprooting in their own architectural work. Basic relationships as those of architecture and "context" or "site" were suddenly altered and the process of adaptation to a new situation was in most cases disappointing. The magnificent work of some exceptional architects, though (as the already mentioned Sert, Bonet and Candela) implies the possibilities of a different approach to the context issue based on a conscious understanding of the structure of the new situation and a remarkable exploitation of the personal competence. The architecture realized by these last revealed itself as surprisingly relevant beyond any reasonable prospect.

The exceptional value of this indirect approach to the environment is yet to be properly analyzed. The contribution to the issue made by these very architects in 1975, when the distance of the crucial events and the maturity developed by our characters were already significant, seems to me the most important document about it. In any case, this self-interpretation of their own architectural poetic was, rather coherently with their previous labour, a honest an unsophisticated enlightening. A simple and even conventional evaluation of their architectural work enables us to understand the scope of their contribution.

This is not probably the place to undertake a detailed review of all their projects during the exile years. This information can be found in their own though scarce texts (8) and in the critical work published by Sáenz de la Calzada (9) a few years ago, unfortunately without illustrations, which corrected, enlarged and clarified Giner de los Ríos´ first book on the matter (10). A complete and unprejudiced history of the issue is yet to be done, though.

José Luis Sert and his labour in the U.S.A. have been sufficiently reviewed due to its international renown. His settling in the U.S.A., an apparently paradoxical choice, revealed itself as a rather coherent election taking in account the elitist character of his previous labour.

Félix Candela suffered a more dramatic exile. He had just graduated from the university and had not prestigious connections to begin with. He had to start from the beginning in Cardenas´ Mexico. He was able though to study one of his favourite issues, the shell structures, in the post-war period and became an internationally renowned "Mexican" architect for it. Later on in his life, he became an official American citizen as Sert with no apparent distress. Sert´s pre-war experience helped him to contact the CIAM group in the U.S.A., and Candela, as we have just said, had no celebrated past: Bonet´s situation was something in between. He was a new graduate as Candela but he had some connections with the Argentinean Ferrari and Kurchan through Le Corbusier who encouraged him to settle in Buenos Aires, a land of promise, almost like a new conqueror. And his projects there soon made of him an internationally celebrated Southern hero.

Candela´s projects, as well as Bonet´s where remarkable examples of the borderline possibilities of Rationalism. The first one explored the potentialities of bare technology while the other involved himself in an speculation about the relations between the organic and the rational. Sert´s development was not so surprising, though, just the natural result of his previous commitment.

I soon understood the crucial importance of this three architects in the panorama of our exile architecture and in 1975 when I was precisely studying Bonet´s (11) work, I proposed to the then president of Galiza´s College of Architects, Andrés F. Albalat, to celebrate a "meeting" inviting these three personages to Santiago de Compostela.

The conferences read by the three architects in Santiago, here published, and Sert´s and Candela´s contributions to Madrid´s Congress reveal a mature absence of rancour for the circumstances of their own exodus. Candela´s irony is extraordinarily remarkable in contrast with the self-reproaching mood of those attending the meeting.

I would like to point out how in 1975 these three magnificent architects, trying to leave aside any personal resentment, just showed us their recognition for their colleagues´ homage.

It seemed then that the long exile was finished. Now, twenty years later, when Sert and Bonet have left us, we want to recall that meeting by honouring Candela´s figure as a symbol of them all. He has been recently distinguished by the award accorded by Madrid´s College of Civil Engineers and Architects..

NOTES

(1) The "ARQUITECTURA" magazine became "Revista Nacional de Arquitectura" after the war. Its first issue (1941) published the list of those dead "fighting for God and Spain". It run as follows: José Manuel Aizpurúa y Amezqueta, Fermín Alamo y Ferrer, Juan Luis Alvarez Carriedo, José María Aragón y Pradera, Pedro de Asúa y Mendía, Carlos Bertrant Coma, Juan Bautista Caballero y Cabrera, Luis María Cabello y Lapiedra, Andrés Calzada Echeverría, Pedro Casellés Tarráts, Andrés Ceballos y Fernández de Córdoba, Carlos Clavell Coll, Matías Colmenares Errea, Ramón Contreras Mongrell, Lorenzo Díez de Ribera y Bereciartúa, Javier Fernández-Golfín Montejo, Valentín Goiburu Lopetegui, Manuel González Muñoz, Juan Izaguirre Epalza, Luis Larrainzar y Vignau, Miguel Legórburu Lizarralde, José López de Coca y Hervás, Rafael López Soriano, Manuel de Luxán y Zabay, Enrique Martí Perla, Manuel Martínez Oyuelos, Emilio Moreno Callejón, Angel Munárriz de Escondrillas, Juan A. Muñoz y Gómez, Miguel Navarro Anguela, Jacinto Ortiz Suárez, Emilio Paramés García Barros, Manuel Pellico Ramos, Antonio Robles Rodríguez, Joaquín Saavedra de la Torre, Luis Sainz de los Terreros y Gómezm Alfonso María Sánchez Vega y Malo, Fernando Santos Saralegui, José sanz y de Berge, Francisco Solana San Martín, Luis Vegas y Pérez and Joaquín Zarranz y Pueyo.

(2) There is no similar list regarding the lossers' side. We have to assume that the total number of casualties was rather similar.

(3) The R.N.A. also published a list with deceased students of architecture: Mario Astorega y Basagoitia, Jesús Alvarez Díez, Ricardo de Bástida y Oña, José Miguel Blesa, Rafael Dabán, César Fernández-Nespral, Tomás Fábregas, Manuel de Llanos Pastor, José María de Isasa, Angel martínez de Aizcoitia, Francisco López-Fando, Emilio Martínez de Velasco, Sebastián Oyaga, Pablo Montesinos y Espartero, Enrique Pérez de los Cobos, Antonio Velasco y Blanco, José Luis Sainz de los Terreros Villacampa, José Salinas y García, José María Angulo Santapau, Manuel Delgado Llorach, José María Arias, Manuel Manjón, Joaquín Beneyto Llorca, Luis Noguera, Javier Bencasa, José Roca, Rafael Coderch y Semenat and Juan Socías Amorós.

(4) Bernardo Giner de los Ríos' book, "Cincuenta años de Arquitectura Española", published in Mexico by Editorial Patria in 1952, included a list of architects who became political refugees after the war. Mexico: Auñón, Azorín, Bertrán de la Quintana, Benlliure, Bilbao, Blanch, Botella (Ovidio), Candela, Caridad, Coll, Detrell, R.Fernández, Balbuena, Gay, Jara, Marco, Martí, Madariaga, Ramonet, Rivaud, Robles Piquer, Saez de la Calzada and Segarra Tell. Venezuela: Bergamín, Capdevila, Lino Bahamonde, Iñiguez Machoba, Salvador Carreras (Amós and Fernando), Ortiz and Yarnoz Larrosa (Javier). Colombia: Esteban de Mora, Rodríguez Orgaz and Tejero. Chile: Rodríguez Arias and Zabala. Cuba: Martín Domínguez. France: Escorsa, Pradal (Gabriel) and Giner de los Ríos. Moscow: Luis Lacasa: Poland: Sánchez Arcas. New York: Sert. Santo Domingo: Fábregas. Giner's list was reproduced by Carlos Flores in his 1961 book "Arquitectura Española Contemporánea". He added the names of Antonio Bonet (in Buenos Aires since 1938) and Zuazo (who spent the war in France and lived in Las Palmas from 1940 to 1943). We should also add that of Jordi Tell Novellas who went to Norway.

5) The Architecture General Bureau imposed in 1940 (24th February) the following sanctions in order to purge those architects politically commited with the lossers' side (after records and dossiers elaborated by the newly organized Colleges of Architects):

1. Permanent Disqualification for public or private archietctural practice: Luis Lacasa Navarro*, Manuel Sánchez Arcas* and Bernardo Giner de los Ríos y García*
2. Permanent Disqualification for trustee or higher public posts and 30 years disqualification for private practice: José Lino Vaamonde* ("Bahamonde" according to Giner) and Gabriel Pradal Gómez*.
3. Permanent Disqualification for trustee or higher public posts and 20 years disqualification for private practice: Amós Salvador Carreras*, Ovidio Botella Pastor*, Emiliano de Castro Bonell and Francisco Azorín Izquierdo*.
4. Total diqualification for private architectural practice in the whole Spanish Territory, its colonies and protectorate: Joaquín Ortiz García*, José Caridad Mateo*, Bartolomé Agustín Berge's, Emilio Blanch Roig*, Juan Capdevila Elías*, Francisco Detrell Tarradell*, José María Deu Amat, Francisco Fábregas Vehil*, José Florensa Ollé, Mariano Lassus Pecamins, Esteban Marco Cortina*, Augusto Miret Baldé, Francisco de A. Perales Mascaró, Pedro Pi Calleja, Juan Pujol Pasquet, Ricardo Rivas Seva, Germán Rodríguez Arias*, Nicolás Rubió y Tudurí, José Luis Sert López*, Jorge Tell Novellas, José Puig Cadafalch, José Gudiol Ricart, Pablo Zavalo Ballarín, Urbano de Manchobas y Cariaga*, Luis Arana Goiri, Antonio Araluce de Ajuria, Tomás Bilbao Hospitalet* and Juan Madariaga*.
Juan Rivaud Valdés* had the same punishment until he would agree with the Superior Commettee for Purging.
5. Permanent disqualification for trustee or higher public posts and 5 years disqualification for private practice after which the architect should pay and established first grade percentage: José María Arrillaga de la Vega, Carlos Mosquera Losada, Germán Tejero de la Torre*, Enrique Segarra Tomás*, Fernando Salvador Carreras*, Alfredo Rodríguez Orgaz*, Eduardo Robles Piquer*, Jesús Martí y Martín*, Cayetano de la Jara y Ramón*, Roberto Fernández Balbuena*, Arturo Saez de la Calzada*, Santaigo Esteban de la Mora*, Fernando Echevarría Barrios, Martín Domínguez Esteban*, Rafael Bergamín Gutiérrez*, José Luis Mariano Benlliure y López Aragón* and Matilde Ucelay Castillo.
6. Permanent disqualification for public posts and established third grade percentage due on any private project: Ignacio de Cárdenas, Emilio Ortiz de Villajos Muller*, Javier Yarnoz Larrosa*, Benito Aroso and Juan Pablo Villa Pedroso.
7. Temporary disqualification for regular public posts and permanent for trustee or higher: José Mauro Murga Serret, Vicente Eced y Eced, Luis Martínez Díez, Alfonso Jimeno Pérez, Joaquín Juncosa Molins, José María Plaja Tobía, francisco Guardiola Martínez and Luis López de Arce y Enríquez.
8. Temporary disqualification for trustee of higher public posts and established second grade percentage due on each private project: Secundino Zuazo Ugalde.
9. Temporary disqualification for trustee of higher public posts: Federico López de Ocariz y Robledo, Rafael Díaz Srasola, Ricardo Roso Olivet, Manuel García Herrera, Joaquín Díaz Langa, Otilio Arroyo Cruz, Fernando Lacasa Navarro, Anastasio Arguinzoniz y de Urquiza, Faustino de Basterra Zabala-Urtena and Luis Vallet de Montaña y Echeandía.
10. Temporary disqualification for trustee of higher public posts and established fourth grade percentage due on each private project: Fernando Chueca Goitia and Fernando García Mercadal.
11. Established third grade percentage due on each private commission: Carlos Arniches Moltó and Alejandro Ferrán Vázquez.

* Those marqued are included in Giner's list

(6) Baldellou, M.A. and Capitel, A. "Arquitectura española del S.XX", "Summa Artis" XL. Madrid, 1995.

(7) Saenz de la Calzada, Arturo. "La arquitectura en el exilio" in "El exilio español de 1939". Madrid, 1978. Vol. 5, page 59.

(8) Leaving aside many articles published in architectural magazines and newspapers (specially by Robles Piquer who became rather popular under the pen name of "RAS") the written production of our architects in exile included:

- Bergamín, Rafael. "20 años en Caracas. 1938-1958". Madrid, 1959.

- Esteban de la Mora, Santiago. "Planeamiento vs. arquitectura", Bogota, 1952.
- Giner de los Ríos, Bernardo. "Cincuenta años de arquitectura española", Mexico, 1952.
- Lcasa, Luis. "Escritos" with an introduction by Carlos Sambricio. COAM, 1976.
- Saenz de la Calzada, Arturo. "La arquitectura en el exilio" in the compilation "El exilio español de 1939". Madrid, 1978, Vol. 5, pages 59-89.
- Sánchez Arcas, Manuel. "Form und bauweiser der schalen", Berlin, 1961 and "Stadt und Verkehr", Berlin, 1968.
- Sert, José Luis. "Can our cities survive?", 1941, "The heart of the city" with Tyrwitt and Rogers, 1952 and "Antonio Gaudí", with Sweeney, 1960.
- Robles Piquer, Eduardo. "Caricatugenia", Mexico, 1955. "Así les vi yo", Caracas, 1971.
- Rodríguez Orgaz, Alfredo. "El Gran Prado", Madrid, 1993.
- Vaamonde, José Lino. "Salvamento y protección del tesors artístico español", Caracas, 1973.

(9) Saenz de la Calzada, A. Op.cit. note 7.
(10) Giner de los Ríos, B. Op.cit. note 4.
(11) Ortiz, f. and Baldellou, M.A. "La obra de Antonio Bonet", Buenos Aires, 1978.
(12) I have to point out that it was thanks to Rafael de la Hoz, then president of the UIA and of Madrid's Congress, that Sert got his official diploma, invalidated in the post war period as a political punishment. This restitution was one of the Sert's conditions to take part in the UIA Congress. I had the honor to tell Sert Rafael's success in obtaining it.

On the reception of the award accorded by Madrid´s College of Architects and Engineers

Félix Candela

10th of October, 1995.

Honorable Major of the city of Madrid;
Distinguished Deans of Madrid´s College of Architects and Engineers, Ladies and Gentlemen.

For those who have led uprooted lives without settling in any place, the best possible restitution is a proof of attachment and sympathy on the part of his country fellows and comrades. And I speak so because I was born in this city and for me being a Spaniard is something I have always kept in mind. I am delighted to receive your kind award as such a proof. I feel moved by the fact that a younger generation has accorded me this prize. Their kindness makes me forget for just a moment the years now past.

I am not complaining about my banishment. It was not really so painful as I arrived in a brother country as it is Mexico. I am even grateful for it because my story helped me to face the world without mean prejudices or nationalistic gestures. As I had no strict country, I felt I could make friends anywhere, I could feel comfortable anywhere, and I did not indulge in the false position of those who think they can eliminate or despise those who have not been born in the same soil, do not speak the same language nor share the same ideals, as it seems to be the norm in today´s world.

I have the impression I have been accorded this prize due to a kind of nostalgia for the times in which, as they say, the architect and the engineer were one and the same person. The subsequent dispersion within the building trade cannot be reversed anymore, though. Things are now too complicated in the world of construction. I also think that probably the so called "magister operis", except perhaps in some celebrated cases (the Renaissance geniuses), was no more than a very skilled person in a particular building technique.

This seems to be my case and so I think I deserve the award because, moreover, I am not an architect nor an engineer.

I will try to make myself clear. I finished my studies in the old School located at "Los Estudios" Street in the popular district of the historical centre but I did not get my diploma because I did not need it for the moment and it cost around 800 pesetas. When my brother could finally get it from Luis Mosteiro, apparently perpetual Secretary at the School, and sent it to Mexico, the Professions´ Bureau, which had just been created, required from me to make several courses and write a thesis in order to become an official architect in that country. I gradually forgot about it because I had many important things to do and suddenly twenty years had elapsed and I had been practicing without a title all that time. When finally, the very Director of the Profession´s Bureau called me to offer me a legal permission I was already leaving Mexico. In the U.S.A., I could not get my credential, though some friends tried to get it for me, because I was not an American citizen. The same happened here when I came back after thirty years and, when I joined for a second time the College of Architects, I was already too old to work. I have probably signed about two projects in my whole life. I always had friends to do it for me and, when necessary, the assistants in my office did it.

Regarding engineering, my only official studies on that issues where the magnificent courses read by Luis Vegas on Materials´ Strength and Theory of Elasticity. I learnt a lot with him and even gave particular classes to my fellow companions and published my notes which circulated in the School and earned some money by it until the beginning of the war. During the last year of my studies I went regularly to the library at the School of Civil Engineering, in Alfonso XII St., where I read the first articles published all over Europe on shell structures.

Once in Mexico and after ten years working as a contractor, I found out UNESCO´s Scientific and Technical Library in which I got microfilms of every article published on the issues I was more interested in, that is, shell structures and Breaking Analysis. With this somewhat frail engineering education I began to design this type of structures and made so many that, even now, Mexico D.F. is the place in the world with more of them erected. I also began writing about and lecturing on that issue in American magazines and in Universities and Architectural Societies around the world. My heterodox education had some advantages as I could discuss with professors and engineers who had somehow forgotten the foundamental and theoretical basis of the complicated formulas they introduced in their computers and who, generally speaking, had just read the articles written in English.

Naturally, nobody was really sure about my being an architect or an engineer, Spanish or Mexican. I liked to be considered a builder, a contractor, because it shocked everybody in the U.S.A., specially in the University context.

In fact, I had to become a contractor, by force, because it was impossible to find someone who could know how to estimate the cost of such structures and discover that they were, in fact, cheaper than the traditional ones. I am really proud about this last datum. Building is a most energy consuming activity and any building technique implying some money saving results in immediate social benefits. Much more than those Messianic dissertations we are so accustomed to. Or were, as architects are not considered any longer social benefactors and, in fact, the most famous among them are precisely those who make the most expensive projects.

Well, I think I should beg your pardon as I have talked much more than I intended about my own stories which obviously should not be the object of my discourse but just say thanks to you for the honor you do me by means of this prize. Thank you.

The Exiles' Experience. The 1975 Santiago Meeting.

Towards the end of may 1975 the Galiza's College of Architects organized, at my request, a "Meeting with Bonet, Candela and Sert" to be held in Santiago de Compostela. Andrés Fernández Albalat was the College's Dean, then.
We took advantage of Sert and Candela's visit to Spain on the occasion of the U.I.A. Congress in Madrid.
Our idea was to gather these three most significant exile architects in order to honour, through them, and in the name of a collegiate institution, all those colleagues who had suffered banishment.
That collective embrace should reach not just our three lecturers but also the whole group represented by them.
Curiously enough, their words, hereby published, did not reveal any sour resentment towards the circumstances which had forced their particular situation. We will then just transcribe them, with no amendments after this twenty years in which they had remained unpublished.

M.A.B.

1 Antonio Bonet

The preparation of this account of my American adventures, since I am not very used, moreover, to give conferences, has forced me to look backwards instead of ahead, as I usually do, in order to recall my activities during such a long period. I will try to sum up in some way or another a prolonged effort employed in convincing a country, several governments and a whole generation of architects of the necessity to built a suitable environment for the better life of common people. An effort realized as a complementary activity to normal professional life. I have also felt obliged to analyze my arrival in Buenos Aires from a sociological point of view. I came out of Le Corbusier's studio full of Rationalistic architectural ideas, a devotee to the CIAM's urban mysticism to which I wanted to attach the allure of the Surrealistic essence. I thought then that Surrealism could humanize or individualize the somewhat too German architecture developed by different European architectural groups. Argentina's cultural, social and political life was, at that time, disturbed by the agitated events in Europe. A conservative government made up by some liberal and some pro-fascist individuals, helped the old oligarchy to maintain its dominion. This cultivated and francophile oligarchy was really attached to old fashioned sumptuous and academic architecture. But the European political conflicts were also present within this group in which the jewish community was very important.

My first contact with this world took place in Paris, in Le Corbusier's studio through the Argentinean architects Kurcham and Ferrari which persuaded me to settle in Argentina. I talk to them about creating an avant-garde group in Buenos Aires inspired in the Barcelona's GATCPAC, whose head was José Luis Sert and of which I had been member. My first action in Argentina was to create this group which we named Austral trying to establish its geographical personality. In order to have a better understanding of the aims of such a group in its historical context I will read you some extracts from the Manifesto we published in our magazine's first issue. "We architects must follow the example of the painters and other artists who have abandoned every moral social and aesthetic prejudice in order to correct the architectural dogmas inherited from the past. Surrealism permits us to explore the

essence of individual life. If we take advantage of its teachings we will stop despising the real user of the house and will try to make of it a real "machine à habiter". This new knowledge about the individual will prevent us thinking about collective problems in terms of the repetition of a unit instead of a sum of diverse elements which is the only way to build a real collective psychology. Thus, we will be able to conceive a new definition of "standard". The links between urban planning, architecture and interior design can be thus established. Our proposal includes the study of architecture as an individualistic as well as collective means of expression; the pure conception of man, with its virtues and defects, as the motor of progress; the incorporation of architecture to the current movement in painting and sculpture and the study of the important urban planning questions of our Republic"

After this manifesto and in order to show ourselves as a belligerent group we published a double page dedicated to painting and organized as a visual collage. We put in it some of Picasso's sayings as "Everybody wants to understand painting. Why don't they try to understand bird's singing? Why can't they love a night, a flower, everything around us without trying to understand it?". Vitalistic and Irrationalistic sayings. Or others like: "The uncertainty found in science and religious faith, give us the right to dream. Dreams are part of real life". This sentences helped us to define our position as a group. I insist we are talking about 1939.

We dedicated Austral Magazine's second issue to a very important theme within the American context. Rural housing and the regional plans. This second issue focused on the problem of inner emigration to Buenos Aires. The fact that we were talking about this matters in a period when the problem was not yet as serious as it came to be and that we were proposing a solution based on the regional planning reveal us how advanced was the Austral group in relation to the Argentinean architectural world of the time. We made clear that: "The abandonment of the Argentinean rural areas and the concentration of the population around the cities (80% of the immigration affects the capital city) make us think about the necessity of a urban organization of the cities and also about the greater importance of the regional plans". The magazine was the most important part of our activities. Those who made up the Austral Group began fighting in favor of a better environment for human beings in urban planning, architecture and interior design. Our effort employed in transforming the cities failed in Argentina as in the rest of the world in spite of the fact that we imposed our views and political positions in three or four occasions. The deepest roots of these problems (basically land speculation) are common in most countries, but in Argentina, moreover, we must also take in account the successive failure of the different governments from 1943.

As I have said, most countries suffer these things, but I consider it would be important to analyze the specific circumstances of the country in which I have tried to fight them. A series of political failures have left Argentina away from its prominent position in the avant-garde of America. Other countries as Mexico and Brazil, above all Brazil, politically stable in Democracy or Dictatorship, have taken the lead. The construction of Brasilia was only possible thanks to this particular fact and, precisely in one of the most democratic periods of the country.

About this time, I made my first project in the centre of Buenos Aires. It was one of the first polemic projects in Argentina, it trespassed, moreover, most municipal regulations. In order to place this work in its own time and circumstances, I will read you a commentary by one of the best known critics of the moment, Walter Hilton Scott. He said: "This house, by a young architect belonging to the Austral Group, has come out as a successful experiment. It makes use of architectural feats as the free plan, dry mounting, use of synthetic new materials and a play of scales, a composition of volumes which cope, in an ingenuous way, with some probably too rigid regulations. It is something new in technique and aesthetic. This house will find strong opposition and contradictory commentaries but, in the tranquil atmosphere of our probably too old fashioned architecture, wouldn´t that be a public recognition of its merits?"

Some time afterwards the I Ornamental Arts Hall was held in Buenos Aires and I won the first prize with my armchair, the one called "Bonet mariposa" or "bestform". I want to make clear that in my architectural work I have tried to make from furniture to urban planning. I consider very important for architects to keep in mind the human scale even while they are designing large buildings and whole urban areas. I have been told that my armchair was the first piece of furniture to be exhibited in the M.O.M.A. The beginning of the European war provoked a real conflict in Argentina´s political and economic world. The country declared itself neutral and in 1943 suffered the Colonels' coup d´Etat from which the, then Colonel, Perón began his political career. Meanwhile Paris was occupied and our group tried unsuccessfully to bring Le Corbusier to Buenos Aires. In 1944 an earthquake took place in the city of San Juan, the capital of the federal province with the same name. I was immediately summoned by San Juan´s Ministry of Public Works. The tragedy of a completely destroyed city was an opportunity for the Argentinean and American urban planning. In those days, Colonel Perón was National Ministry of Work and for him the tragedy of San Juan was a real platform in relation to which he began to disclose a grandiloquent demagogy. This was his first approach to celebrity. In spite of the fact that Argentina was a Federal Republic, a conflict was established between the National and Federal governments whose development prevented the so hoped urban planning revolution.

There was a real change in the country which affected my activity as a planner and I took the opportunity to move to Uruguay. As you know, Buenos Aires and Montevideo occupy the opposed banks of the Plata River, there is just one night sailing between them. But the river shore is completely different in both cities, with sand beaches and pine forests on the Uruguayan side. This fact, together with the progressive lack of freedom in Argentina made of Uruguay a favourite destination for Argentinean tourists. I was then commissioned to design a 1500 ha. touristic complex in a marvelous site with beaches, a lake, forests and mountains, called Punta Ballena. It was a very important project and I had to move to the forest for three years. I made a master plan and realized the first phase. The existence of beaches, lakes and mountains made me think about a triangle with three different linear residential areas along the beach, the lake and the chain. A large star shaped area included the services, retail center, hotels, entertainment etc... and connected the three residential areas. The vertex of the triangle were occupied by three other areas: a touristic one along the cliffs, a farming one and a urban permanent area for the artisans employed there. This was the first time that a touristic area was being developed without the classical maritime walk, with traffic segregation established by taking advantage of the terraces and natural dunes which were traversed by raised pathways built with the timber of the nearby forests. I also built there one of my better buildings: the "Solana del Mar" building. I also used there for the first time the Catalan brick flat vaults. This induced a young Uruguayan engineer of Galizan origins, Dieste, to study this building technique and use it in later constructions with excellent results. During this same period I designed, by Punta Ballena, a house for Rafael Arberti and Maria Teresa León called La Gallarda. This has been the only house so far owned and designed by Rafael.

In 1948 I received an invitation from the Buenos Aires town hall to participate in Argentinean urban planning. The Buenos Aires town hall must organize an immense city which houses a third of the country population and therefore has an enormous political weight. In those days, the Peronist enthusiasm produced an official somewhat triumphal architecture. The town hall was nevertheless governed by a section of the Radical Party linked to Peronism but with a more marked personality and a stronger political tradition. The official world was then in search of a nationalist architecture. They tried to get rid of external influences and looked for nationalism in Greek and Latin classicism. The situation of progressive architecture in Argentina was then very similar to that of the Bauhaus against the nazi party. Alejandro Bustillo, the most important Argentinean architect of the time, proclaimed: "Our country has been created and populated mostly by Mediterranean races, of an Iberian, Greek and Latin origin and with a classical inheritance, and it would betray itself by neglecting its traditions. We must be alert and keep the classical styles in architecture, just modifying them in an artistic and intelligent way, trying to avoid the excessive influence of modern ways. We should promote therefore a monumental Argentinean architecture of a Hellenic style as taken from its most original sources and the traditions derived from it".

Meanwhile, the Perón government had undertaken a very important and necessary industrialization process in a country which had suffered the consequences of the collapse in Europe's industrial production. This industrialization, developed without a clear plan, and in a time when European cities had already proved how negative was industry for urban planning, provoked a real flood of immigrants from rural areas to Buenos Aires. Perón, unconsciously perhaps, wanted to promote even more the already imposing city of Buenos Aires in relation to the rest of the country. The more people would live in Buenos Aires the less mighty Federalism would be. But the lack of appropriate urban planning in Buenos Aires and the terrible mistake of driving there the country workers degraded the city to an inconceivable degree, provoking the apparition of shack districts in the peripheral areas which came to be called "poverty villages". These "poverty villages" were a bothersome counterpoint to the sumptuous official architecture.

In these circumstances, the Minister Secretary of Public Works of Buenos Aires town hall decided to face the serious problem of the city's general planning as, for centuries, it had just followed the scheme laid out by the Spanish conquerors. He summoned up three architects, all of them from the Austral group:... Hardoy, who lived in Buenos Aires, Jorge Vivanco, professor of architecture in Tucumán, to the North of the country, and I, who was living in Uruguay in Punta Ballena forest. Nine years of action had elapsed and it seemed now that it was the turn of the most important city in South America. We began to work in what was called the "Buenos Aires General Plan Bureau", directed by a council which was basically made up by we three. We created a very complete team with people from the Austral group, young architects who had been educated under our ideals. We also incorporated two or three architects from Chile, as their country was then in a very similar situation as it is now; we also called some economists as Moyano Lerena who had been Minister of Economy during the period previous to Perón's return. We called lawyers, experts in transport, among which the Catalan Batcher who had organized the Barcelona traffic during the Republic etc. We all had to quit our own studios in order to undertake this ambitious transformation of the big city.

Buenos Aires was, at the same time, the Republic's capital and the main port, almost the only one, in the whole country (that is, the gate to Argentina. It was also the railway main junction, and a very peculiar one, as the railway was built by the English for their import trade and not for the country benefit and the network was based on a radical centralism. Buenos Aires was moreover a big industrial city, a financial center for the whole continent, an immense urban cluster whose extension had nothing to do with a European scale. A general plan for Buenos Aires had to take in account the whole country, specially as it had to deal with problems as seaport and railway decentralization, distribution of industrial centers and airports. It was essential to solve these issues and at the same time establish some control over the use of the land in order to regulate the monstrous growth of the urban cluster and begin to plan its future development not as a city but as a real archipelago of cities harmoniously scattered over the region. That was at least our proposal. One of our departments, that working on residential areas, analyzed the traditional districts in order to find sociological data. We decided to avoid the famous urban unit established by the anglo-saxon, the neighborhood unit, which consisted of groups of 5000 inhabitants. We chose instead to create districts with a marked personality and a population of 40000 or 50000 in. capable of including the indispensable community services for a socially organized and autonomous life; that is: a community centre, sports facilities, diary and general supplies, health center, nursery, primary and secondary schools, technical education center, etc... At the same time we designed a real district unit to be built in a piece of land taken from the river and located near the River Plate Stadium. This district was based on rather radical premises as the independence of the housing elements from the transit paths and their dependence, instead, on sunlighting; pedestrian and car traffic segregation; a density

of population appropriate to its being part of such a populated city; minimum percentage of land employed in erecting buildings; creation of leisure areas just by the housing units; complete social services etc... In order to make people acquainted with our proposals we made a film about this district which was shown in movie theatres around nth whole country.

In 1950 the momentary wealth enjoyed by the country suddenly finished. Perón had exhausted the national deposits plus the benefits of four years of meat and cereals export trading in a world with no concurrence. This same year, Perón dismissed the minister Miranda and began what was lately called stabilization plan. One of the consequences of this move was the sudden taken over of the town hall by the Peronists. As it usually happens, the relative autonomy of the town hall (though really minimum) was not tolerable for certain people. All these circumstances determined that the change of authorities would provoke a kind of revolution that resulted in a new situation totally incompatible with our aims and position. In 1955 the, so called, Freedom Revolution took place and with it Perón's expulsion. This military, but liberal movement resulted in a new atmosphere of enthusiasm and hope. Then after giving a lecture in the Faculty of Philosophy about the necessity of renewing some traditional but derelict districts instead of letting the city grow indefinitely, I was called by the president of the National Mortgage Bank, a government agency which acted as Ministry of Housing. After some meetings we decided to renew the most important of those districts, the one called Sur and I got the commission of this project. I established the limits of the area to be remodelled, about 200 has. in the very core of the city. This project came to be one of my most important contributions to Buenos Aires urban planning. I applied in the design most of the principles we had been fighting for with just the minimum modifications due to the differences between theory and practice: traffic organization by means of differentiating rapid, medium and slow routes; segregation of pedestrian paths from car traffic; strong definition of the concept of district; creation of a community center in each unit for the development of public participation and debate; complete cultural and health facilities; a big green area located in the center of each unit; a variety of open spaces, from the smaller "plazoletas" (similar to the ones previous to the apparition of the car) to those permitting extended architectural views (by the way, this was an old idea of mine which I precisely recalled yesterday night walking around Santiago); institution of a harmonious relation between the new grid and the present city trying to preserve the order established by the traditional blocks. This project was supported with enthusiasm by the then President of the Republic, General Aramburu.

In 1953, some time before the Sur project, I had designed in Buenos Aires my first project for Spain. It was "La Ricarda" house, a villa near Barcelona based on big vaulted modules placed one by the other creating different open and closed spaces among the trees of a pine forest facing the sea. With this work I began an intermediate phase in my career in which most of my work consisted of projects for Spain which I developed in my Buenos Aires studio. Bit by bit I came closer to this country and at last I felt myself going from time to time to Buenos Aires instead of traveling on purpose to Spain. Some years ago, the unexpected way in which this intermediate phase evolved forced me to settle in Spain in which I have worked intensely mainly for private clients. I designed here some works for other countries as a completely prefabricated hotel for the city of Algiers and a housing development for Maracay in Venezuela built with an industrialized reinforced concrete system. To finish my account about South-American urban planning, which was my lecture's issue, I would like to recall, precisely, this later contact with Venezuela. I have discovered another South America, somewhat less European than that in which I lived in Argentina, but which has recalled me the emotion of finding a country with incommensurable urban necessities and in which any project must be undertook thinking about the future. This sensation is something impossible to find in our old and hyper-civilized Europe always afraid of betraying its past when facing the problems of the present. And this is precisely the most evident contrast between our dense Europe and that young Continent whose strong vitality guides it towards the future.

Paraguay St.& Suipacha Building
This is the first project I did in Argentina, in Paraguay St., in which all the levels, the ceiling heights etc. contradict the regulations and which was a rather polemic work at that time. The first floor is a double height and is the studio of an sculptor, the other has a vaulted ceiling. The lower part has a series of elements which can be considered somewhat sculptural and which are completely divergent from the street's traditional character. The inner part of the upper floor presents the mentioned vaulted spaces, something unseen up to that moment in Buenos Aires.

BKF Armchair
This is the armchair which won the first prize, the B.K.F. (Bonet, Kurchan, Ferrari), I suppose you have seen it in magazines and so. This picture was taken in the Punta Ballena complex, in Uruguay.

Four houses
This is a group of four houses located in a residential district in Buenos Aires and built around 1942. One of the vaults covers a double height space which is the source of light of the rest of the rooms in the house. The facades are, thus, almost blank planes.

Punta Ballena
This is the plan of the Punta Ballena Complex. The sides of the triangle are occupied by the residential areas: one located by the beach, another by the lake and the other one by the mountains. This A. here, over a star, marks the great social centre with shops, entertainment, hotels etc. The three ends of the star define three intermediate spaces: one of them was dedicated to tourism, another one, called "chacras", was an agricultural area for the site's self supply and the other one was occupied by the permanent residences. There was an airport, just by this circle on the left, that began to be used afterwards. The first one, though, was, even then, being used to travel to Buenos Aires. This is the first phase, with the fast road by the sea which was part of the country's general plan. Then there was a wood of giant trees and, just before these curves, I had some of the trees fallen down in order to have a clear view of the sea, what they call "abras". So when arriving in Punta Ballena, one can contemplate the sea from the woods. There was a pedestrian network in the inner part of each district, therefore each house had car traffic on one side and pedestrian paths on the other. The ends of the star penetrate each district just in its very centre and reaches the sea creating a rather appropriate leisure area. The Solana building is located here.

Here you have one of those pedestrian paths and you can see how it meets the car road. All this passages are very light, they were built with timber from the nearby woods so you can imagine the size of the trees. This passageway is intended to segregate completely both traffics.

Solana del Mar Building
This building was located in one of the ends of the star, that over the sea, that is why it was called Solana del Mar (Suntrap of the Sea). It includes a restaurant, a cafe and a small hotel. I took advantage of a dune over the beach. So what I did was to build an immense concrete slab embedded in the dune. The three floors were ground floors and the circulation system had no staircase. The dune went up like a kind of hanging garden. In windless areas, it was possible to have dinner and so. From the different floors one could always go out at ground level. There was a double height space with an sculptural element which was a chimney and everything in the building pivoted around this piece. The upper floor, the roof was also a ground floor because the dune kept going up and people used to take a walk around this terrace which is like a garden roof before entering the building. The vents of the chimneys downstairs, of the rooms, come out at this level what makes of the terrace a space with a rather Catalan character.

Berlingieri House
This is a house I made in front of the sea in which I used for the first time those Catalan vaults. There are separated sitting and dining rooms (which are double height spaces) bedrooms and bathrooms. In fact, it is like several apartments all put together each with an independent entrance from the sea side. There was also a dune there and I used it in the same way as I had done in Solana. The upper level is therefore like a mezzanine because it leans against the dune which goes down to the sea.

La Gallarda House
This is La Gallarda, Rafael Alberti's house, which had a great porch which we cannot see in this slide by the sitting room which was a double height space. There was a kind of atrium which was the source of light of all the bedroom windows above and in which Alberti painted for us. You know that he almost earns more money painting than writing.

OKS House
This is a project I made when I went back to Argentina from Uruguay. It is a metal frame house with a visible welded structure, with no rivets. The beams and columns are completely visible on the outside as well as the inside. The structure creates a series of modules some of which are filled while the others remain empty. The space is very peculiar in this house, very geometric. This was the idea I wanted to develop.

South District of Buenos Aires
This is the main sector in the city of Buenos Aires. Here was the Riachuelo (the estuary) with its port, the first port in Argentina, the original one. Which worked during the Spanish colonization when Buenos Aires port was really that estuary called Riachuelo. Later on they built other facilities which are still in use and finally they created what was called Puerto Nuevo, today's main port. The whole Argentinean railway network which was built and owned by the English for many years, is based on the existence of this port. There is a line towards the North, another one to the West and a third one to the South. That means that from everywhere in the country it is possible and almost only possible to get there because the railway was not conceived for the development of Argentina but for the wealth of the English. Here we have an airport, three railway stations, the centre and the city. The city is located to the side of what is called the centre. That is, the Spanish town of Buenos Aires had a clear arrangement with traditional square blocks. It included the centre and the Riachuelo port. This was the nucleus that grew during two centuries. But at the end of the last century there was an epidemic of yellow fever and all the wealthy families moved outside the old town and created a suburb with English-like houses and gardens etc. and they abandoned this part which began to be called South District, though it used to be the centre (in this drawing you have the North to the right, all the plans of Buenos aires have the North to the right). When the yellow fever was over the country recovered its normal life and many came back to the old town. The most prosperous found their old mansions too old fashioned and began to build a district to the North. Nowadays, this is the most aristocratic part of Buenos Aires, the district of the Argentinean great bourgeoisie with its French style architecture. This process resulted in the progressive decay of the South district which had been the centre and which still had the institutions, the city and the port. This sudden decadence was incredible, it is something that Europeans might not completely understand. I decided then the area that was to be renovated and which included a railway station and the Zama park. Beyond Belgrano St. the buildings had some historical quality and it was unaffordable to undertake a refurbishment project which would include them.

This white line is the limit of the operation. We have here the Zama park and the Southern Railway station. There is an avenue here which was already begun. It is the world's broadest avenue because they had intended to make a street of 30 or 40 m. and they began to demolish blocks but someone came, who though about the future, and said that it was better to have 130 m. It is the 9th of July Avenue and they built it by sectors. Then, when I defined the limits of my project I decided to prolong the avenue, which is nowadays the main road in Buenos Aires, up to the station. The traditional Spanish blocks were in a dreadful state. They used to have houses with inner courts and so but these began to be progressively occupied. Each block was around 30m. long and there was nothing in them but old low and derelict constructions. The abandoned state of the district at that time was inconceivable for a sector of the city so near the official centre.

This is the diagram I used to organize the district limited by the boundary lines of the operation. This horizontal lines were two fast roads, one of them the 9th of July Avenue. Some other renovation plans of the city had

already used this system: each four blocks there was a broadened street or avenue. So I divided my area into 6 sectors defined by the prolongation of the avenues and tried to recover in some way Buenos Aires' traditional blocks though keeping the already opened avenues which transformed little streets into 30 m. roads. This squares here are the new blocks which had a central green space so each building had a street facade and another facing an inner garden.

The city's main retail services were to be located within this district. In each sector there were little shops and bars but not this mentioned main commercial areas. This later was located in the centre of the district, linking the six sectors. Therefore, each one had a certain autonomous life but also had a necessary link with the rest of the city. There was a system for traffic segregation and the pedestrians did not have to meet the cars when going from one sector to another.

Here you can see how the idea began to take shape: the prolongation of the 9th of July avenue, the great square before the access to the station, the preservation of some historical elements and of something of the traditional structures. You see the green areas and this mass which is the commercial and administrative zone. These dark stains are civic spaces always connected to the green areas. They try to provide the citizens with something they have lost with the urban life: open spaces to meet people, to talk, to give one's opinion, something like what we saw yesterday in Quintana Square at two o'clock in the morning with all those youngsters seated on the steps talking and laughing.

There were three types of construction: high-rise blocks, the towers, always in groups of three, other, middle size, buildings, what we called "greca" which define the squares and the third group formed by 6 m. high buildings, mainly painted in white which we called "vaca". These later include the schools, the sports and social clubs, the little shops etc. They define small squares and define the areas of pedestrian traffic. This idea of the three scales refers to the human scale (White buildings), the scale of the trees (Grecas) and the vision from above, something almost independent from the district (Towers). They try to illustrate the three different psychologic reactions of a citizen.

Here we have one of these areas. The black stains are the pedestrian paths; you see the multiple squares, there is like a street fragment and then another square and another and then a no through lateral square. You see how the transition takes place from one sector to another, always within the pedestrian level. It is clear how the pedestrian is the master of the whole space.

Here you have a perspective of one of the civic spaces. It can be gained from the parking lots below. So what you perceive is the cross section and not the plan of the spot. Here, without cars, it is still possible to have open air bars, restaurants, meeting places and so.

Galería Rivadavia

In this building I tried to make use of the vaults in high-rise construction. The building is completely supported by almost flat vaults. There is not a single horizontal floor slab; the floor system is all vaulted construction. There are, nevertheless, very different spaces and types of apartment. Instead of the typical two or three types, we have 30 or 40 different apartments; with double and single heights combined and so.

Terraza Palace

I designed this building to be erected by the Sea at Mar del Plata, an Argentinean town which, during the summer, has almost a million inhabitants. I wanted to make a terraced construction in order to avoid that inhuman character of many buildings they were erecting then in Argentina and, as I see, now here in Spain. So every apartment had an open adjacent space facing the sea and the overall volume was not so aggressive for the landscape as the typical vertical construction. I began then using ceramic pieces for outside decoration which was something really new there and I even made use of the color in order to individualize each ambience.

La Ricarda

This was my first project in Spain. I did it 22 years ago, in 1953, in a wood by the sea, near Barcelona. This isolated element is the porch and tries to symbolize the structure of the whole house, its basic idea. The different elements define open courts and there is something of a complete unification between outside and inside spaces. There is a great chimney with a Romanic fresco which belonged to the owners of the house whom I suggested to place it there. The play of the vaults above is somewhat determined by this painting. This piece of stoneware is an industrialized model made in Catalonia for the Acid Factories, they use it as an adaptor between a tube and a bowl and I found it perfect as a gargoyle. I also designed this other piece for this house which you see here without its glass but which bears color glass pieces in other places.

2 Jose Luis Sert

Friends and colleagues: you may be waiting for me to tell you my story; but this business of summarizing 36 years (those which I spent out of this country) in such a few time, seems to me a rather difficult task. So I just will give you a brief account of what I have tried to do during my life. First of all, in the School of Architecture I belonged to a group of people who did not agree with the way architecture was taught in those years. I don´t know weather it has improved or not but what I know is that architectural education had then nothing to do with the real problems of the world in that period, and that situation induced us to create the GATCPAC (Group of Catalan Architects and Technicians for the Progress of Contemporary Architecture). Much has been said and written about this group, what it did and what it could have done. We were so lucky that the day we inaugurated a little meeting club was the very day in which the Spanish Republic was proclaimed; and it was a day of hope and great expectations for Spain. We started then working in Barcelona hoping that many things would happen and that we would be able to do what had not been yet possible. And we tried to do our best. Everything we did was published in the A.C. magazine (Contemporary Activity) which you probably know. Torres, Illescas, Rodríguez Arias and many other made up the group, I didn't do everything, our work was a real collective labour. My friend Bonet was also there although he was somewhat younger and came a little bit later. All that effort was made thinking about making something radically different because we thought that the epoch wanted that from us. We were looking for something different, I remember I went to Paris, it was 1926, and I saw in a bookshop, in the Castiglion street, the first books by Le Corbusier: "Vers une architecture", "L'Urbanisme", etc. I bought them and took them to Barcelona. We organized a meeting, me and my school mates, and reading those books we found a new horizon, a new world, what we were looking for and had not found yet. Some time later we saw an add in a newspaper: Le Corbusier was to give a conference in Madrid, in some place called Club Femina or something like it. We wrote to Madrid asking him to come to Barcelona as we were really interested in meeting him. He decided to come. We went to meet him at the Francia Station, Barcelona's most important railway station, we had him for a few days and he read us some conferences. Le Corbusier complained about everything. When we told him the conference was at ten in the evening he thought this was a mad country. We told him: this is the custom here, people usually has a late dinner and the sooner you can organize a conference is ten o'clock in the evening. He gave us a conference series during those days. He was with us. We visited the city. He was astonished by Gaudi's works: he was really interested in everything Gaudi had built. We discussed with him and this was the beginning of our group's labour. When he left Barcelona he told me: if you want to work with me at Paris, I will be delighted to receive you at my "atélier", rue de Sèvres.

Two years later, when I finished my studies, I took advantage of this offer and went to work at Rue de Sèvres. I found there a group of volunteers, nobody earned a penny and we worked hard. Le Corbusier had not many commissions at the time; he did some projects and he didn't know weather they would be built or not. I arrived when he was making the second project for the Society of Nations. I came back to Barcelona after that: I went there and came back several times and kept working with the group. It was about then that we did our first buildings in Barcelona, the block in Muntaner street, the anti-tuberculosis dispensary at Torres Amat street, the so called Bloc house (which I think was our most important work; now it is more or less destroyed, transformed, and nobody can recognize it anymore). After a while, when we were working hard, the Civil War began. And I went to Paris to work for the Spanish tourism office at the Embassy. Then Luis Lacasa and I were commissioned to design the Spanish Pavilion for the International Exhibition in Paris. We got Picasso, Miró, Alberti and others to collaborate with us, a bunch of very important people though our budget was reduced.We began working in the U.S.A.. Three months after my arrival the Second World War began; we had arrived in July, my wife and I and in september the war began in Europe. I had gone to the U.S.A. as a tourist and was officially a tourist for six years. After that time, when trying to renovate my visa, an employee from the State's Department told me: "Mr. Sert, it seems you have been a tourist for too long a time". And I: "I can't do otherwise". So they finally accepted me; I had to make some papers and a trip to Canada but I went back to the U.S.A., settled there and began working seriously. I also had the opportunity to work in Latin America. I was a teacher at Yale, in New Haven and had some South American pupils that got me some commissions in Latin America. It was a chain reaction: first Brazil, then Peru, Colombia, Venezuela and then Cuba, etc. Twelve years of architecture and urban planning, making master plans and pilot plans. I did Bogotá's master plan with Le Corbusier. It was very interesting but urban planning has advantages and disadvantages. It is a good exercise to thing about big things, to see the relations between building and environment and every all those things which when designing a single building are usually not taken in account. It is useful. But the main problem is that, even when your plan is approved (and we got many plans approved) its realization depends on many political unexpected circumstances. When we began in a democracy we ended in a dictatorship and vice versa. The job was not easy but it was interesting.

Some of our plans were partly realized. For example the streets in Medellin follow our plan, part of Bogotá's, etc. But we architects like to see a third dimension erected and that is not easy. It is a question of time and trouble but when one thinks about working in it for years, one would rather look for more immediate things.

Through Walter Gropius and some other people from the Bauhaus I had contacts with Harvard University. I gave some series of conferences and then Gropius retired and asked me to go and teach in Harvard. I said: "Mr Gropius, I have taught for some months in New Haven and in Brooklyn School but it was the War and I had to do something. I have never thought about working in education for my whole life". "All right, he said, let me give your name even if you are not completely sure about it". He gave my name and one day, it was Saturday and I was working (architects not always respect weekends, and you are here as a proof), and I received a phone call from Harvard's president asking me if I wanted to be Dean at the Design School. I said, "let me think about it, it is too unexpected; I must think about it a few days". And I finally said yes because I was free to leave it at any time. They gave me everything at Harvard, I could organize the school and do whatever I liked and was not obliged to stay for any period, so I phoned him and accepted.

I was really interested in organizing the school in a new way and see weather my ideas could be applied to create a new curriculum. But I made clear at Harvard that if they wanted me to do "fund raising" to improve the financial and social situation of the school, they should know that I didn't know a word about economy, I wasn't interested in it and I would do it wrong for sure. They told me. "Don't worry, when time comes for the school you will have the means and specialized people from the University to do it for you". I said "All right, it is fine". I accepted the post

and remained in the school for sixteen years, as Dean and Chairman of the Architecture Department, which was Gropius' title before my arrival. And I enjoyed it because I was with the "master classes", the post graduates and I met there architects from all over the world. Half of the pupils were always foreigners. People from South America, Africa, Indians, Japanese, everything, Scandinavian, French, whatever...

It was really interesting. It was like having a laboratory all for myself. During sixteen years I was able to do my experiments with all those people which was, I think, good for me and good for them. Education is something that helps the teacher as much as the pupil. What other reason could be for both to be together? That was my stay at Harvard. But after Harvard and after the war I began again travelling to Europe. I came back to Spain, mainly to Ibiza, where I had some friends and which had always been a favourite place for us, for the GATCPAC group, because we found it a very interesting place from an architectural point of view, very...uncontaminated. Germán Rodríguez Arias went there, and then I went there and we both start going to Ibiza. I made some houses, little things. We have a house over there and we like to live in it. But my roots, after thirty six years are in the U.S.A., I am really used to live there and work there. I have a really good bunch of people who have worked with me for years now, those things cannot be improvised. An architect can be a little nomadic but there is a limit for him; a writer, a painter, he can go around easily.

Now, I would like to show you some examples of the things I did in Harvard University and some urban plans as the one for La Habana which was my last plan for Latin America. We will see some slides, we can talk together, you can ask me and I will do my best to answer you. I think the best conference would be a dialogue, a common talk, because conferences are usually monologues, and monologues are not very useful. There are too many monologues nowadays; we know our limitations anyway. So we can begin with the slides and I will explain you some things. I had asked for a cue, but there is no use, nobody plays billiards anymore, it is too old fashioned.

Sert House

Our house in Cambridge. The project was made seventeen years ago and we have been living in it for sixteen years now. It is a small house, based on the ideas I had been studying when making minimum housing schemes for South American cities. It is a patio house, nothing specially new. A house with different courts and almost no views of the outside. A house that one can control, because in Boston the climate is terrible and if one has a view of the street what happens is that one just sees a mass of snow during the whole winter and each day the snow is dirtier and less pleasing to see. Then, there is the dogs, the neighbours' children. It is difficult to have some privacy in open gardens. So we decided to build a wall around the whole lot which is more or less the same size as the so called Lewitt-Town houses, very popular in the U.S.A. A lot of 60x100 feet with three different courts: one in front towards the street, one in the middle and one to the rear, limited by the block with the bedrooms, the garage ,the common room, the kitchen and the small library and a little passage for the car. The central court, if you want to have a reference for the scale, is more or less 8x8 m. These courts are being currently used, to have an outdoors lunch or talk with our friends. They are protected spaces, very useful and comfortable because although Boston is very cold in winter and rather hot in summer there are also many sunny and pleasant days which can be spend in the garden. These small openings are vents which create an air current. In my house I wanted to have like a mix of everything: I have an sculpture by Calder which he gave me when I came to the U.S.A., I have Chinese and pre-Columbian ceramics, an Aragonese altarpiece, etc. This is what Italians call an "insalata mista", but, well I live like that and I like to have things from different epochs. I have no prejudices, I like modern things (some modern things), but I also like things which are not modern at all. The main worth is quality and not age. There is a mural painting by Miró. He did it on purpose for the house because he had lived with us and he new very well the way we were. I made a project for his house in Majorca and I gave him the plans and a scale model and he gave me the mural in return. It is the highest revenue I have ever had, because the mural is worth four times the project I made... so I was well paid. My patio house has the possibility of long perspective views. This is something I specially wanted to do. I was very interested in this perspective issue. This quality of some old buildings in which the space flows from one room to another. It is something rather infrequent in modern construction. So one standing by this white wall can see another wall 100 feet (32 or 33 m.) ahead in the rear part of the lot. This is rather impressive if we think about the small size of the house. The bedroom, a space enclosed by two sliding windows has a kind of "grafitti" made by Constantino Nivola, a guy from Sardinia who had worked with Le Corbusier and whom we had met in new York.

La Habana

From this minimum scale project we go now to a Regional plan. This is a plan for Havana, a preliminary sketch. After many essays we came to design something like the skeleton of the city. The lines you see are the main road, which is like the spinal cord of the whole Island and other secondary roads penetrating the city towards the centre, the port, etc. The scheme was the refined result of many previous drawings on which we worked on an elimination basis. Here we have a cleaner plan and we can perceive the different units, what we call measure units etc. You have to keep measuring all the time, it is a bit tiresome but very interesting and we can see how, from the initial skeleton we come to define the new communities established in the periphery. They are independent communities. Those marked as yellow circles are existing nuclei; the blue squares are new developments. The whole city is reorganized by means of scale, units and measurements.

We have here a more detailed plan. The skeleton, the penetration roads and what we called sector units, which is something that was discussed in the CIAM congresses. We see the new peripheral network and the already occupied areas in yellow with the parks in green. We established a new zoning with different areas defined by their density, function etc.

Here you see the relationship between these red roads which are almost highways, the secondary roads and the park system. This green network, these tentacle-like masses are green spaces filling the gaps between built districts. We tried to emphasize the green areas and community centres in each sector.

We have now a closer view with the main divisions within the city, the position of the institutional buildings, and the long pier. The green stain links the historical elements (there are still some old bastions), the New Ministries etc., there is also an area built over the sea. There was also a project to build a Presidential Palace beyond the port using some old bastions. This is not a joke. It was many years before Castro and we asked for the bastions' plans and they told us: "Ask in Harvard's Central Library. They probably know about them". And surprisingly enough, they had them and sent us some copies. They were 18th century fortifications and they had no real value.

This is an study of the organization of Havana's old centre. It was rather difficult to organize because most streets were the same size. We wanted to keep the old narrow streets, which were appropriate for pedestrians, these are the yellow ones; and here we have the orange ones which were to be broadened. That is, we did not want to broaden all the streets, which is something rather usual, it is stupid but they keep doing it. We wanted to create alternate pedestrian paths and built parking lots in the central courts of the city blocks which are occupied with storage sheds and every kind of derelict construction. We could clean up these spaces and reorganize them, which is probably a better thing to do than having them like they are.

This is the same as before but here we have the monuments and institutional buildings in blue, the parks in green; look at the Prado walk, the old Prado walk and here the Cabaña citadel and the port.

Maegth Foundation

This is the Museum or Arts Center created by Paris' Maegth Gallery, the Maegth Foundation, which belongs now to the French State. When we inaugurated it, ten years ago, we had André Malraux at the ceremony, I made the official offer to him. It is a museum, a centre for art exhibitions which has been working very well so far. First of all, it is located on top of a green hill with a magnificent view of the Mediterranean Sea. There was also a pine wood, which has been carefully minded and now it is currently used for sculpture exhibitions. There is a big piece by Alexander Calder. This is the passage towards Giacometti's court. It was a very interesting work for me because I had known most of the artists there represented in Paris, we used to meet each night at a cafe. There are some paintings by Braque, who died some time after we finished the building, works by Giacometti, by Miró, by Chagall... who were not so well known then as they are now and who used to spend much more time then at the cafe that they would now. We used to talk about a thing like that. It was one of our dreams. And then I received a phone call from Maegth. He had visited Miró's atelier in Majorca, and he told me he had liked the building so much he wanted me to do something similar as a temple for arts and we had fun doing it. It was very interesting because the very artists worked with us. Giacometti, for example helped us to place his figures in the court. It was a real cooperation and this was really fascinating.

In the park near by they usually organize parties and concerts and every kind of meeting. The vaults are a quarter of a circle and they distribute light in a rather appropriate way for painting hanging purposes. I have always been an enemy of artificially lighted museums. It is like a gallery in the very centre of a city. They have not that varying quality just given by natural light, specially in an area like Saint Paul, in the Côte d'Azur, which is always so sunny. Here, the elements for light diffusion are essential. These are made of reinforced concrete and bear skylights. It is possible to place electrical fittings between the ribs. They are, thus, a very flexible structure for exhibitions.

A detail of the concrete vault, painted in white. The walls are also white and flooring is clay tiles. The terrace of the great hall, a double height room for meetings, conferences, etc. This is the sculpture garden, with works by Miró. We call it the labyrinth. But the only one that has got lost in this place is Miró himself. He is a somewhat dreamy character and we found him coming and going around the labyrinth. He was not able to find the exit. The garden has curved walls whose upper part is painted in white, something rather common in Majorca, Andalousia and Ibiza, in order to enhance their profile. Here we can see another sector in the garden and the terrace of the main hall from which one can see the roofs and courts of the rest of the village, the Mediterranean, the Cap d´Antibes and the Grimaldi and Picasso museums. It is rather impressive because, you can also see the Alpes, always covered with snow.

After this experience, a rather successful one because Maegth is a great promoter, an incredible "animateur" as French say, they asked me to design the new museum, an enlargement area. Unfortunately, Saint Paul de Vence´s town hall is rejecting this project but I think we will be able to make it pass because there is always a way to make things acceptable. They say that it is too large, that the surrounding area is occupied by villas and that our building is already too big to think about enlarging it. This new part has a ramp, a great hall which is, as French say, a "polyvalente" space, that is, it can be used for many purposes, any kind of event, concerts, cinema which they usually organize during summer. The leit-motif is always the same, a series of courts used for sculpture, linked by means of walls facing the garden and creating a continuous sense of circulation. A very important thing in this kind of building is not to misguide people, not to get them lost, not to make them pass twice by the same spot. So I have tried to organize a clear system of circulation, although in the lower part it gets somewhat complicated with the cafeteria, the library, the conference room, rooms for mechanical appliances, painting storage basement, etc.

Apartments for married students

I also made some apartments for married students at Harvard. This was made after the war. They permitted many soldiers to join again the university after the conflict. Many of them were already married and they were given special conditions to facilitate their incorporation. We made 500 apartments and an underground garage which is something very difficult at Harvard because there is a retaining wall along the river to create a kind of

pond which is used for canoeing. We designed three towers, not very large but towers anyway and some other buildings which made up a rectangular space, something of the monastery-like character so common at Harvard. We made three towers because this is the minimum number of elements which define a space. Two do not create a space and three define a central space which is the nucleus of our composition. The three towers are connected to the lower buildings by means of suspended bridges. We could, thus, make rather densely populated towers. We could not have done it in any other way because if we wanted elevators we needed many apartments to share the costs; that is the economic reason why we made such towers. They have a solar protection system located in their west facade. Its balconies have a triple use: their main function is that of any balcony, look over the scene, towards the river. They are also solar protection elements and finally they are the required "second exit" for fire escape. This is very important in the U.S.A. In this case, it is possible to pass from one balcony to the next one by means of a panel which can be opened as a door. The actual regulations do not contemplate such things, they are full of absurdities and are worse each time they change them. Specially in New York. There is a terrible concern in America about fire, big fires as that which took place in San Francisco many years ago. It is a rather curious thing, the problem of scale. One learns a lot by doing this kind of thing. I recommend you this type of exercise. We began doing it a Harvard's School of Design: to make a series of scale models of existing buildings. One finds amazing things. These towers you have seen, big as they seem, are ridiculous compared to Skidmore, Owings & Merrill's Chase Manhattan Bank in Wall Street. I mean that people get used to it, scale is something relative. When one arrives in New York, there is a real shock but after contemplating all those skyscrapers, one begins to have another sense of scaling that, I must say, has little to do with human scale. Specially in the case of later buildings as those towers of the World Trade Center which are really inhuman. They have no scale reference nor anything. They have no roots because promoters never have money enough to buy the land such a building should occupy. So the parking and circulation problems at ground level are not solved at all. They have just placed these immense buildings in the old district whose streets were designed for horse carriages and whose lots were occupied by smaller constructions when Manhattan began to be inhabited.

Science Center

The main Walk. What we were looking for in all these projects for Harvard was a clear commitment to the University general arrangement. Our elements should help this general organization. In this case, as in the Sciences Center with its corridor/street, we eliminated the real streets and made a pedestrian walk for everybody in the neighborhood to approach the river in summer, lay on the grass, take a sunbath etc... and see the canoe races. It is, in fact, a small walk but there are many things in it. Meeting rooms, and every kind of social service in order to encourage people to live in community. As they are, in fact, students from all over the world it is very interesting for them to meet. They come here and live in a peculiar neighbourhood. They are part of it.

The bridges linking the higher buildings with the top of the lower ones are really glazed corridors, not central corridors but glazed, with natural light from both sides to have a perfect view. There are small apartments at this level with vestibules from which one gets to a lower and an upper apartment by means of a small staircase. That is, the elevator just stops every third level to make things easier and less complicated. The apartments under and above the corridor have views over both sides. These corridors made possible the elevator system for such a number of apartments. The relationship between the towers, the higher elements, and the lower buildings, stepped towards the river, is established by means of these corridors which have roof gardens on each end in which children and grown up people can play and take the sun and contemplate the river. There is always something up around the river. For example, the rowing races between Harvard and Yale and the other universities and people like to participate in these events. There is a special garden for children with different swings and children's games, specially those half ruined houses they like so much. Children like breaking glass and take abandoned houses. They have their opportunity there to do the later and, as everything is made of concrete they cannot break too many things. The volumes are designed to prevent any obstacle in the view. When two buildings are too close one of them is lower than the other. There is nothing stopping the light nor the view and at the same time we try to create small and interconnected open spaces instead of separating completely the buildings by means of open large but shapeless spaces. I have always taken care of open space design. It is as important as building design. You have to think about its shape, its scaling, its textures if you want to make something attractive.

I want to point out that, since the days of the GATCPAC I have also been very interested in low-income housing, in helping people to live better without higher expense. I think that of all the things an architect can do, one of the most important, one of the most useful is a profound study of housing conditions and their possible improvement. I am not talking about the houses of wealthy people. Those have no problems, they just expend whatever is necessary to get what they want, but about those who would need low-rents but dignified spaces, well organized and improved by everything which is not the house in itself but community services, open spaces, etc.

So, to sum up, we have clear circulations, very apparent elevator towers, the strip windows of the corridors each three floors and the bridges linking the higher and lower buildings. The shades can rotate for a better solar protection. The facades are a rather dark brickwork which is similar to that of other brick buildings around, like the university dormitories.

Roosevelt Island

This is a much bigger project. It is located in New York, near East River, in what is called now Roosevelt Island and used to be Welther Island: it is a long isle which is like a scale model of Manhattan, very long and narrow and which is now beginning to be occupied. The masterplan was made by Philip Johnson and I and other architects, among which my current team. Most of the houses should be stepped in banks towards the river. There will be a cable train between Manhattan and the island. The river is divided into two branches and there is plenty of sun and light and besides it is a rather amusing place because the ships go up and down the river by it. There is always much life at the riverside, so there are terraces over it. But we could not get permission to make these terraces accessible because the authorities are obsessed about suicide. They think people is going to commit suicide if they are provided with plenty of places to do so. But they can go anywhere in New York to do it, just by their own house. They are also very worried about drug traffic. But these are not appropriate places to sell drugs because they can see you well enough from everywhere and catch you. Here we have the staircases, these white elements which are emergency stairs and the elevators. There is also a clear intention to enhance the presence of the vertical elements. There are glazed corridors with the same system as that in the last project, that is, the three floor unit system. Besides, this is a good number because it is the maximum one can climb without an excessive effort. The three floor unit is used in lower and higher buildings and it is visibly a repeated element in the whole composition. The programme was dense enough. Land is very expensive there and taxes very high but we could do nothing but accept it. The programme is something given and we have to adapt our projects to it.

These buildings on the right are the most expensive apartments within the complex, and they did not come out better than the others; I must say that the cheapest where the best. That is, the expensive ones did not have this three floor unit system, each floor had its own corridor which was a central interior space, with interior kitchens as most of the apartment buildings in New York: a dark corridor with doors on each side. The cheaper ones had magnificent kitchens with views over East River and Manhattan. That was obviously better but regulations do not permit it anymore. These volumes placed in the open courts are schools and other community services: swimming pools and every kind of social facilities. There is a street with a colonnade (as here in Santiago, though not with so noble a stone) connecting the schools and other community centres. We were constrained to use brick so we designed a kind of terracotta with vertical channels which has a nice texture and quality. It is interesting to notice how in these low-income housing developments, contractors are beginning to use sliding aluminum windows with double glazing, electrical heating systems and so on, which were very expensive things a few years ago. But the production is so important that they are beginning to be rather affordable.

Here you have a small diagram of the plan. The corridor floor is the intermediate and there are stairs leading to the upper floor, with no corridor and double orientation and to the lower one, which is similar. So just the apartments in the corridor floor, 33%, have a single facade and are smaller while 66% can enjoy both views which is something very important in a city like New York. The plans are, besides, very simple. Standard elements are repeated once and again.

3 Félix Candela

As I am the last one to make my contribution within these conference series prepared by Antonio Bonet, José Luis Sert and myself, I think I should express my recognition as well as my partners' and our wives' to the Galizan College of Architects and our Galizan colleagues who have been so kind to us and have treated us so well in our present visit. For me, this meeting has been very important because it has been my first visit to Galiza. I had never been here in spite of the fact that my second surname is Outeiriño. And to discover Santiago, to see the few things I have seen of this land has been touching. I really have enjoyed it.

There is also another thing for which I am extremely grateful: this is an opportunity to talk about myself. You even encourage me to do it. This is, obviously a most pleasant thing and it is not always easy to find such a demanding public, almost captive in this room to which, as it is usually expressed, give a lengthy sermon. I will try to explain a bit of my personal life, just a bit, because I have come through so many things... Some of them I think are very important; they where very important to me at least. I was born in Madrid, grown in Madrid, I made my first and secondary studies there, and there I finished my Architectural Degree. I graduated in 1935 after studying for years in the Estudios street and completed my degree in the University City. I did not began architecture because I had any vocation or special aptitude but just by chance. My father asked me when I graduated from High School: "And what do you want to become". I said "I don't know, I have not the slightest idea". And he said: "Well, I have a friend who is studying architecture; we can go and visit him to see what he can tell us". We went there; his name was Chapa. I think this architect is dead now. He told us what I should do to join the school of Architecture. And my father said: "does it suit you?". And I: "Yes". All right. Then I began to study what was required to join the school, that is, two years of science and drawing and I joined the School.

As I know that later on there will be questions about what should be taught in schools, how the curricula should be and all that stuff, I want to make clear that I am very happy with what I was taught in the Old School of Architecture. I had two or three good teachers, as in any University, there is always some good and some bad teachers. Good ones teach you things; and bad ones are also good for you because they show you what you will find outside the school; the injustice is even greater. That is, that kind of education is very interesting from a personal point of view.

Then, I think that the school should not, cannot, train architects. That is, although it might seem a paradox, a school of architecture is not the place to train architects. It should

educate men who, if they work hard enough, could become architects in the future. But the mission of the University, of the school is not that of producing architects but men who will be able to become architects. I finished my degree without problems but the thing is my father died when I joined the school, I had no money and was forced to earn some money giving particular lessons. It was easy to find people who wanted particular lessons on difficult subjects as descriptive geometry. I was three years helping others in descriptive geometry and I was paid for it. And the third year I began teaching materials´ resistance which was also a difficult subject for my companions. These two things helped me a lot. That is: I am afraid I must disagree with José Luis on his opinion about models. I think an architect should be able to see three-dimensional ideas without the help of such a childish device as it is a model. I understand that, in some cases, it can be useful in order to see some details but, as a general rule, I am not in favor of models. Of course I respect José Luis´ opinion but we can disagree and will disagree in many things which is more amusing than agree. Then, I think that descriptive geometry, as it was taught in the old school, although it might not seem very useful for your professional career, is very interesting because the school is, precisely, the place to take the opportunity to learn what you will not see again in your life. To teach exactly the professional skills is an error. You will learn it in your first work outside school. And there are other things which you won´t find again if you don´t learn them at school.

Apart from that, I finished my degree and, when I was studying my sixth year, Torroja was then designing the Recoletos Pelota Court, and I worked for him and Arniches and Domínguez for two weeks as a draughtsman for the Hippodrome project. I got then very interested in shell domes or whatever you call them; and I began to gather information about it and read articles and so on. I remember I copied a German article, I didn´t speak German but I thought it was important and I copied it all without understanding what I was copying. Then, this article happened to be the most important text I have read about the matter and I keep it still in my own handwriting. When I finished, I heard something about grants to study abroad. The Beaux Arts Academy of San Fernando funded a grant called Conde de Cartagena which was bestowed each year upon a painter, an sculptor and an architect. Then I applied for it. I did it with two other companions and none of us had any special merit. Then it happened that the other two had important contacts and I didn´t, both families began to put pressure on the jury and they, no knowing who of the two was mightier, decided to give it to me. Because I wanted to go to Germany, I was very excited about going to Germany and study what German masters where then doing. Then I received the money of my first grant, it consisted on some golden coins. I don´t remember how many, but I remember something, it was the 18th of July of 1936 and...I didn´t go to Germany, I stayed in Madrid and I came through war as every other young man then. But I was in the front, in the Ebro battle, I came through retreat, and then the Concentration Camp, etc...That is, I had no support but I had a rather good time because I learnt a lot. I learnt much more in the war than I would have learnt in Germany. Then I was taken to the Concentration Camp and I spent there four or five months. I was also lucky in this situation and I can´t say I emigrated. I am a pure refugee; not an exile, a refugee. Then someone put me on a list to be taken to Mexico and one day I heard the speakers shouting: to Mexico. Where is that? We went there. They took me to Mexico. And I arrived in Mexico with nothing at all, with a uniform full of louses, sorry to mention it, from the Concentration Camp and I had nothing but that uniform and my hands.

One of my greatest satisfactions is that everything I have done, has been done by myself. I didn't work for any important office, for no learned master. I have learnt everything by myself, at home, reading articles and books till I did find what I was looking for.

Mexico, in spite of the fact that I was a newcomer, was an easy country for professional purposes, because Mexico was then developing very fast and if one had any skill (I was a good draughtsman and that kind of thing), it was not difficult to find a job. First of all I was a colonist in Chihuahua. The Spanish government in Medellín (I mean the Republican one), had some money and spent it in buying a property in Chihuahua (a hundred km. to the north of Chihuahua) and they sent a group of people to colonize the estate. It was obviously a failure. All the workers in the estate had been at least Commanders during the war and it was very difficult to give orders to people used to command themselves. We stayed in it for a year and it was my first and only attempt in urban development as I designed a small village made of wood planks. With the wood leftovers, that is, the bark and so, we opened a sawmill and the village began to prosper. I was even designing a town hall when everything finished.

I went then to Mexico D.F. I had the first job I applied for. I worked for six months for a draughtsman or an architect or whatever he was and then I found an Spaniard who had been (I am talking too much, but I don't know how to...), a man who had been a draughtsman in Zuazo's office and who worked as an architect there in Mexico, of course. He found me by means of a common friend and offered me to enter into partnership with him in Acapulco. Acapulco was then a small village (with two or three hotels) and he asked me to join him there. And I went there. Just my wife and I because we had no children and I had just five pesos in my pocket. He got us into an hotel and next morning the hotel's owner told us: "This Mr.Bringas hasn't paid us for four months now, and the man of the iron and the other one too etc..." A disaster. But we were lucky enough to participate in a contest to build 18 four-bedroom bungalows in the Papagayo hotel. I got the job and the owner said "You will have the commission" just looking at me and not at my partner who was much older than I. He said "You guarantee me the work will be done". And I: "Yes, Sir, I will do it". I got the commission and I began doing everything: I made the drawings, supervised the works, collected the money, paid, kept the books, everything. It was a very trying experience to work as a contractor, and the only contractor; very interesting.

I went back to Mexico D.F.; I worked for some years with other Spanish colleagues, Jesús Martí and Calzada who had settled in the capital. I began to bring my family to Mexico; my mother, first of all, and then my sister and my brother. When my brother came we decided to work together and we got a commission in Mexico D.F. It was a big low-price apartment building and then a Hotel for the same client. Then my brother, who was always very fond of gambling won a lottery prize, 100000 dollars, that is, a lot of money. Someone told us about the good opportunities found in film making: we began to make films and lost all our money in six months. So we were film producers for a while in Mexico D.F. It was also an interesting experience because that world was completely different, full of gamblers with no ethics nor respect for anything, real bandits; everybody cheated on us. Another disaster. Then we had a bad time because we had no work nor money and I began to study again those things I was so interested in and which I had also studied in Spain and began collecting information about these issues but with a somewhat changed criteria, that is, I had grown up then. Many things had happened. When I began studying here (in Spain), I believed everything that was written in a paper, in a book, even what was written in newspapers. But then I began reading in another mood, with a more critical attitude, and began to select from my bunch of papers, articles and books those things which were really important. And, when I had my opportunity, I began designing that kind of things. That is, the problem I had with those shells (as they are called in Mexico) was that most articles, all of them in German, written about cylindric vaults (which are nothing else than void beams), were very difficult for me. That is, I found many mathematical difficulties. Then I was lucky or skillful enough to try to look beyond it. And the answer was beyond that math. Someone helped me, that is, someone who wrote a very sensible article about these things and I began building them. Then, bit by bit, I came to clarify all the structures I was building. I did everything by myself, nobody helped me. I began collecting articles, in microfilm, and gathered all the available information about the issue and I began to understand it. Then, when I had already built some of these structures I started another phase which was the Conquest of the U.S.A., that is a conquest in my field, not a military conquest, but I somehow conquered the U.S.A. from my Mexican apartment because I began publishing some works. That is, I was in my forties and I felt I was prepared enough to do some things I had not been able to do before, it is a marvelous sensation. It is like with sportsmen when they feel in shape and feel as if someone would push them and run much faster than they really can. That happened with me, I felt then I could write, something I had never done. And I began writing, even in English, someone helped me with the translation, and sent the texts abroad. I also decided: I had done some things which are not bad, I can be famous, like others, Can't I?, well I will be famous, why not? If it can be helped...And I decided to be famous and somehow I managed it. I began to send articles abroad because publishing in Mexico was somewhat dangerous, because I was always a stranger in Mexico. I have like an alien complex and I feel like a foreigner everywhere. I was a foreigner in Mexico after thirty years living there and I am still a foreigner there because I speak "golpeado" (with strokes) as they say Spanish talk. In the U.S.A. I am also an alien and everywhere. I worked for years in Mexico without legalizing my degree, because I did nothing of what was required. In fact I had no official title when I left Spain because I hadn't asked for it. My brother obtained it and sent it to me but it was already late; they said to me it was more difficult then, I had to take some exams and so and I didn't bother. I was twenty years working in that way, I was the most famous architect in Mexico but I couldn't legally practice my profession. I practiced with no official title at all. At the end I got my title. A friend of mine told me: "I know some people in the Professional office, with 500 pesos we can arrange it; you give me 500 pesos, I divide them and you get your paper". That was the way I had my official title.

As I was saying, the Conquest of the U.S.A. was very interesting because I began giving lectures in English without speaking English. José Luis knows very well how this was, because he invited me to give a lecture there, one of my first conferences. I went there and began reading my paper and nobody understood a word, and that was my first English lecture. At last I learned how to lecture in English and came to do it better that in Spanish. Everybody tells me about my marvelous English lectures because, as I don't speak English they find them very funny.

One important thing is "I escaped..." I never had any intellectual inclination. I lived in Madrid which was somewhat of a cultural pot; there was a strongly cultural atmosphere but I was not very influenced by it. I had a slow development and never had that Saviour complex so typical of architects. This is something very common in schools of architecture, they persuade students they will save humanity and the world with architecture and that kind of stuff. And they obviously believe it and are always frustrated because at the end they redeem nothing. But I am not; I only wanted to prove myself I was able to build my things. And I did it.

Funicular vaults

The first thing we did was a small structure, a span about 6 m. long; with no reinforcement, no iron nor formwork of any kind. We placed sacks between the supports and began laying the mortar, which is not an easy thing to do as it collapses rather frequently. But Mexican masons are very skillful and they finally succeed in doing it. We removed the sacks and there it was. I reproduced a system then used in England, I tried to take ideas from everywhere.

Conoids

Then, my brother and I went into partnership with other two Mexican brother architects and a friend of them. We associated to built one of these structures. This was the first thing we did, a conoid, copied from some French projects. We made a factory for the father of one of them. The idea was to use the formwork several times by securing it from just four points. In order to facilitate the formwork removal we placed the tension rods on top. This was the only variant we introduced in relation to the French models. Then, the father did not like it, he did not pay us and we made no money out of it. We finally had to dismount the formwork and reuse the timber in other structures. It was an interesting experience. I was then rather persuaded by my readings about the issue. They said that these structures where rather delicate, concrete had to be high quality, very dry and so. I wanted to make it very thin, about 2.5 cm. and with a very dry concrete. Then the shell surface was all "cacadita", as they say in Mexico, full of cavities, and we had to cover them and, besides, the gravel was loose and it fell away. The most interesting element was the formwork. I had read about it in some article. The best way to remove the formwork was place it over a sand box and secure it from just four points.

The idea is that once the concrete hardened, one side of the box is unfastened, the sand then flows and the formwork begins descending slowly. Beautiful. But we pierced the box and the sand did not come out and when we finally removed it the formwork did not slip because it was stuck. I do not know what happened that time. So the workers began to hit the structure and it collapsed. I did not use anymore that scientific formwork system.

Barrel vaults

Then we did many small things. Some pavilions for a newspaper which used to raffle a daily issue among its subscribers. We made three or four pavilions, all of them with characteristic roofs and so. This was the entrance to one of them, a slab formed by two conoids, with a curved edge and two straight sides. It was 12x6 m., had just two bearing points and even presented a 6x6 cantilever prolongation, which is rather a lot. It was very nice and a rather remarkable structure. But I did it too flat and finally one of the corners began to sink and sink and it ended with a deflation of 60 or 70 cm. I did not pass by it any more.

Inverted umbrellas

Then, after some months or even a year, we had our first opportunity to make a bigger project. We wanted to use an industrialized system. Reuse the formwork and so, in case of many repeated units. This is the cellar, the storage room of Mexico´s customs offices. There was a railway crossing the nave and the trucks remained outside. The merchandises entered by one of the ends and came out by the other. There were two canopies to cover the two cargo platforms which where these cantilevered structures. The plan was 20 m. long with a 6 m. cantilever at each side. The structure was made up by independent units supported by four columns between which there was always an expansion joint. Because Mexico's soil is very bad and I knew that, when the loads would be applied the floor would have differential settlings of about 1 m. The work came out rather well and we could use the formwork several times. Naturally there are two tension rods supporting the vault and the cantilever. But as one of the loads is much bigger than the other one, there is an important moment here at the head of this column so the form of the support is a response to the stress law. In this case I knew we had to adopt a thicker section for the vault and since then we employed 4 cm. as standard thickness. It does not require any special treatment and there is no point in making it thinner.

Short barrel vaults

Later on, we had the opportunity to use the same system of barrel vaults and tension rods but without cantilevers. This is the enormous nave of "Aluminus Co. de Norteamérica" in Veracruz. It was the first time they wanted that kind of project made in concrete, they had always used steel so far, and they were very satisfied by the results because it worked out better than the others. The roof is the same as in the other case. It has more or less the same span, 20 or 21 m. and has expansion joints each 60 m. The distance between columns is 7,5 m. and the joint between two sectors is a bit cantilevered.

This long barrel vaults were in fact conceived and calculated as beams. This type of structure had been the object of many complicated studies but someone called Johansen wrote an article in Danish showing how to manage them as simple beams. I found it rather reasonable and began doing it. And they did not collapse, why bother then?

Long barrel vaults

This is another long barrel vault. And here we also have a North-light folded roof. It is a bit more complicated because in this case, the centre of the span bears a positive moment, but we also have a compression centre here, and here a tension centre and another here, so that we have two tension and two compression forces. We have to find the gravity centre of all these stresses and the lever arm, then divide the moment by the lever arm in order to calculate the stress. It is a bit more complicated but it is not a problem of math but of geometry, just products and divisions.

Hypars

When I was still a student or has just graduated, in 1935 or 36, I read some French articles about the Hyperbolic Paraboloid. It is a very interesting surface and I always got fascinated by its paradoxical character of being a curved surface made of straight lines. The possibility of building it with straight elements was something which made of it an easy thing to do. The building system is the same as that of a flat slab. You place beams on one direction and then wood strips in the other sense, wood strips as formwork: it is so simple... Them, this hyperbolic paraboloid is represented by the simplest second grade equation, and this facilitates the integration of the so called equilibrium differential equations. It is the only second grade surface that has a unique and complete solution for these differential equations which permits us to play with the constants of integration. That is how we calculate the stress functions. That means you can have any portion of the surface and figure out all the forces, the stress along its edges. So once all the pieces together, we know the stress functions of the whole surface without complicated mathematical calculations. To sum up, it is a double curvature surface, which is something very good for structural purposes, its straight generatrixes permit the use of very simple formwork and you can calculate it with elementary methods; it also has another peculiar characteristic; it is very difficult to make something ugly with such a nice surface. It has some intrinsic beauty which is something very considerate for the architect because you really have to make an effort to create something ugly with it. Some have, nevertheless, done it, but it is not easy at all. I mean that this kind of automatic beauty is also very interesting.

Umbrellas formed with segments of Hypar surfaces

For example, here we have the famous umbrella. It is made with four sections of paraboloid, their centres all together on the sharp point. I had seen a similar scheme in a French magazine around 1936, in an article by someone called Amon. In 1950, when I began designing things like that, I was a bit surprised by the fact that nobody had yet tried it. So I was a little afraid. Then I realized that nothing happened, that the structure worked perfectly well, did not need many calculations and was rather economic. So I drew the following conclusion: those who find cheaper and simpler ways to do things, in this case cover a space, benefit society even if this is not their intention at all. So I like to think I helped to make popular a kind of structure which is very economical and which can be used anywhere.

Inverted umbrellas

I also figured out the optimum size for this type of structure, which is somewhere around 10x15, that is, 150 m2. It can be square or rectangular, very long, but you should never go beyond the mentioned area because if you make it smaller, it becomes expensive, that is, you have to make the same number of columns for less square metres and if you do it much bigger you have to increase the depth too which should be proportional to the surface. This kind of umbrella is also very useful as a foundation system when soil is loose or bad or when you need a large slab as in the case of the erected umbrellas in which we use individual footings of this kind.

You can also use this kind of inverted umbrellas for low-income housing. It is a very economical solution because you begin the house by the roof and then you build the walls, which are not bearing walls because the roof is supported by the central column. I once figured out a budget for 2000 roofs of this type and it was something around 30 pesos/m2, which is equivalent to more or less 150 pts/m2. The budget even included the contractor's benefit (my benefit) but they did not give me the commission because it was a Town Hall which had to decide it and I surly did not have enough influence there. So they told me that they did not like the plan of the houses: as they had a column in the middle, the corridor had to be a fixed element and the inhabitants could not modify their own houses. But we built some of these umbrellas for a hotel in Cuernavaca which were used as bungalows including two bedrooms, the bathroom etc...

Variations on the Umbrella form

So be began playing with those umbrellas. Here we have the entrance to a laboratory building in Mexico. I will not mention the names of the architects. I was only the contractor and builder. Sometimes I did the projects but in most cases the architects were others. I was not the architect but just the contractor in many of these works.

Later on, I became an advisor in the project team for Mexico's subway. I designed a series of roofing systems as this one with small umbrellas divided in triangles. It is an umbrella like the other ones but made with triangles which form a rectangle of 6x9. Here the main concern was form and not budget. This is a subway station in Mexico. It was rather interesting.

This is one of the first things we did. After the umbrellas, we got the commission for this church in 1953. There is a curious story about this commission, there is always one, and I could tell you so many. But in this case, for example, I had two Mexican partners and one of them was a rather... bohemian guy, we may say. He had married and divorced the same woman five or six times. They quarreled, they divorced and then they married again and that was all. In that moment they were separated and he was dating a girl who was the Second Manager at the Bank which provided the land and part of the budget for the church, which would be a temple for the Paul Fathers. We already had the commission because it was the girl who decided. I intended to make use of the paraboloids but in a more artistic way. We made the project very fast, in just a week we had some sketches, the plan, some elevations and we handed the drawings to the Fathers or monks or whatever they were. They did not understand a single line and they called an architect whom they had as an advisor because he was the brother of a woman who belonged to I don't know what Committee. But, luckily enough, I had made a service to this architect, I had provided him with some commissions and when he arrived he said: "This project is very good". So they let us do it, though they were frightened when they began to see how the works progressed. They were terrified by those emerging things but the women in the district began to come along and say: "this church is very beautiful, are you the architect?" And then the Fathers were rather astonished but they said: "If these women like it, it is probably all right". The church is all paraboloid.

It has three naves and a transept. The transept is made with four paraboloid surfaces which are like deformed, higher umbrellas. Here you can see another outside view of the church. We added some mural paintings and stained-glass windows afterwards. One of our colleagues, José Luis Bellliure designed them. We never did any scale model of those structures, just the plan and elevation drawings, maybe some sections. We just waited for the results. And the result was always somewhat more complicated than the first idea. After this church, my brother and I built about 30 or 40 all around Mexico.

Curved edge Hypar

This was the first paraboloid I made in Mexico D.F. It is a pavilion for Cosmic Rays in Mexico's University City which was all erected in 1952. It is a small pavilion, just 10x10 m., and it has these two saddle vaults which are just 1,5 cm. thick. Just that, because that is what they wanted. They asked me: "Can you do it?", and I "Yes, I can". And I just changed the proposed barrel vault into a hyperbolic paraboloid. The facade is just a curtain; it creates a play of light and shadows. It was very interesting, I had never considered myself an artist. And when they published this work and it was so much praised I felt very proud. I began to think I could make some funny things.

Straight edge Hypar

This is a church in Monterrey. Two giant paraboloids. The cantilever (25 m.) was made with two paraboloids with an slanted axis. But even this slanted part can be poured without exterior formwork. We repeated this same church in other place because we quarrelled with the owners. I made this one with Enrique de la Mora with whom I worked a lot because he had connections within the Church and was also a good friend of mine, a fine person. So we made together this temple; he designed it and I was the builder. As I have said, we repeated the same project in San Luis de Potosí. And there they let us work and we built what we really wanted.

Groined vault formed by two meeting Hypars

If you put two of these surfaces together and make them meet, you get a groined vault which is better than that resulting from two barrel vaults as it has straight generatrixes in two different directions and is yet a double curvature surface. This is the vault we made for Mexico´s Stock Market. We built it around 1958 or 60. Here you can see the formwork we used, with its

beams, its strips and laths, the wooden staves and these triangles which form the groin. It is bit more arduous than the umbrellas which are rather more flat but it is simple.

Then, working with this surface and thinking about the way it works, I realized I could transfer the loads towards the groin and get them concentrated there in such a way that the loads would be transmitted to the soil just through the four corners of the vault.

This is another triangular vault, it is also a groined vault though its key is somewhat raised. Instead of creating a saddle point, it has a sharp point just here, in the centre. It is an 18 m. span. It was located in Acapulco but it does not exist anymore. It was the night-club, the cabaret or the boite of a hotel, President Hotel, in Acapulco, and two or three ears ago they tore it down to build a tower. Fortunately enough, I had some photographs.

This is a restaurant we did in Xochimilco. There is also a long and funny story about this commission. It was not so funny, though, when we had to bear it but it is good as a story. This has eight bearing points, it is an octagon with a 30 m. side and almost 45 m. cross span. It is just 4 cm. thick and has no ribs at all. It is a very neat structure. Notice the trick of receding the bearing point to obtain a continuous edge, this sharp point here. You get a very nice and continuous form, thus.

This is Bacardi's Factory, in Mexico, the bottling plant, with six vaults like the previous one, all without ribs, and all 30x30 m. The scheme is rather similar to that of San Luis of Yamasaki airport. I wanted to build the same structure without those enormous arches they erected in the U.S.A. Here you can see one of the vaults, it has a 30 m. span and a square plan. You see the rim here; it is rather thin, isn't it?.

Groined vault formed by two meeting Hypars

This is an outdoors chapel at Cuernavaca, with a 30 m. span and 21 m. high. It is a simple paraboloid shell. The formwork for this vault was very expensive because we only had to build one unit. Here we have part of the reinforcement. The structure is somewhat floating on a light gravel hill, what they call a tezontle in Mexico; so we had to fix the bearing points by means of four cables all the way around. The chapel is located in a very beautiful valley to the South of Cuernavaca.

In this project, after many years building this type of surfaces, I realized how there was a limit to the size of these things. Everything has a limit. This is an interesting question because it has to do with the progress issue and so. One has to think about the appropriateness or inconvenience of further development from a social point of view. That means: nothing is good or bad just by itself, it depends on its size, its quantity. There is a point in which things begin to be bothersome. That is the case of shell structures. If you go beyond 30 m. you begin to have too many difficulties. You can do bigger structures but it is not a sensible decision.

Mexico's Sports Palace

21. This is the Sports Palace for Mexico´s Olympic Games. There was a contest and the contest project was somewhat different in form, though the idea was more or less the same. We proposed a series of shell structures filling the bays between the supporting steel arched structure. It worked fairly well. The contest was rather weird, as always in Mexico. They presented the contest rules very late, just two years before the Olympic Games. They organized the contest and invited 39 architects to participate in it. The Ministry of Public Works chose them all and divided them into groups of three. They put me with Antonio Peirí, Maciá´s grandson, who became an architect in Mexico and another Mexican architect, a friend of mine, Castañés. When we accepted the invitation, they handed us the brochure (in fact, two books, 500 pages each) and gave us 15 days to present a model. Then we spent the first day discussing our acceptance, because Peirí said: "I don´t want to be an architect any longer. I just like to paint and I will paint". And we had to persuade him though we lost that first day, in fact we did not lose it because we had a nice time talking and discussing but we did nothing about the project. The second day we met to begin working on it. I talk to them, persuaded them, and I went home to draw my vault which I did in a single night. I already had an idea, that is, I was not a genius nor anything of the kind, but I already had an idea and I just had to draw it, nothing else. So then, we were not able to change a line and we just drew it all and finish the details. By the way, the brochure was really weird. I opened the first book and began reading, it was written in an unknown language, a rather strange Spanish, and I did not understand a single word. So I said, if I have to read this, I cannot make the project. And Peirí committed himself to read it and said "tomorrow I will tell you about it". He came back next day and told us: "They simply want 24000 seats and a central track 80 m. long because this is the longest distance they need of all the sports they will have there. So they could have saved themselves the trouble of the volumes because we had to rethink the programme and ask many people and, besides, we had plenty of space under the platform to put whatever we wanted there. We have eleven arches in both directions, this is a redundant, very safe, structure. That is, if one of the arches fails, the others will do its work. Loads are divided into them all and nothing happens. Then we designed shells to fill the gaps. Shells made with a network of aluminum hollow sections covered with plywood and then with a final copper sheet. Each arch has a pair of buttresses.

The walls. We had the opportunity to try different systems and we decided to shape them as paraboloids. That is, we have a normal brickwork wall whose form is simply warped. The play of shadows is magnificent. These are cavity walls with the cavity filled with concrete. You make about 90 cm. of wall, then pour the concrete and continue. It was easy, the masons learned very fast and all the walls around were made according to this system, with ordinary brick.

One of the advantages of the cupolas is that the load transmission is very simple. That is, the cupola is more or less 150 m. wide and it goes down to the ground by means of the buttresses while the middle platform bears the lateral stress. This is the middle platform, the public platform. The level below, that of the track is were all the services are located. We have two different levels then, one for the public and the other for sportsmen. But the funny thing is that the roof itself creates the facade.

We had to do it very fast because there was no time left. After the 15 days given for the development of the projects, they took them three months to choose a winner and the date came closer. When we began with the final project there were just 18 months left for the Games´ Inauguration. I was not the contractor in this case, just the architect with Peirí and Castañeda so I felt very free and easy, with less responsibilities. I had been the contractor in most of my previous projects. In most of them, architect and builder and, if something happened I was the only responsible subject. Not in this case as everybody was involved.

Others calculated the structure and I did not bother about it because I knew it would be all right, it was impossible to make it fail. I tried to take a look at their work, though, because I did not want them to change it too much. But there was plenty of people working on it and I felt rather free of any responsibility.

Here we have a tension piece which I wanted to be a rod, a cable but we finally decided to use a stud to make it more rigid. This stud bears tensile stresses and, together with the depth of the truss, it makes the structure capable of bearing negative and positive moments. That is, the arch is not just a compressible structure, it can bear moments and its form is dictated by the paraboloids it must receive from either side. So everything works together. Structural and shape issues are both taken in account.

Once this three arches built, they needed no longer those towers they had built so they removed them. This structure is rigid enough to bear the other arches with no additional scaffolding.

The copper sheets are 45 cm. wide and 2 and something m. long. We built the largest roof in the world: around 20000 m2. We got a very low prize, moreover.

But the size is almost gigantic. They told us not to bother about acoustics because they would simply celebrate sportive events there and some amplifiers would do. Of course they inaugurated the Sports Palace with Beethoven´s Ninth Symphony.

The copper roofing was magnificent but then it began to decay. It became grey and rather ugly and unpleasant but they finally washed it with some detergent and they applied a lacquer coat and it is now almost as in the beginning though not so brilliant.

Stimulating architectural creativity *

Josep Lluis Sert

In my sixteen years of teaching at the Graduate School of Design at Harvard University, I came to the conclusion that you can stimulate, develop, and speed the creative process, but you cannot teach creativity. Creativity lies within each individual. It is a gift of nature.

To stimulate it, it is possible and necessary to apply certain approaches and methods. Many experiments have been attempted attempted in this direction.

I presume that you would expect me to talk to you about new methodology and technical advances that have developed in recent times, especially in the USA, such as computer aids. But, as I know that these have been widely publicized by professional magazines and I presume you are well acquainted with them, I prefer to dwell here with some elementary human factors that seem to be overlooked or purposely ignored.

We cannot ignore or underestimate the fact that the vast majority of architectural commissions have as their background the urban or metropolitan areas of today. These are constantly changing as cities are growing beyond all predictions and control.

Our buildings are shaped by cities around them. They are to be part of an urban pattern. They are part of urban design.

By being aware fron the very initial stages of the work about these factors, we get a broader view of the problem and are able to determine the basic lines that will guide the development of the creative process. After twelve years or urban design applied to entire cities and the disappointment of seeing, at best, only partial results, I came to explore the urban design possibilities of smaller projects. You may call these the frustrated attempts of an urban designer, if you so wish, but when you believe in certain principles or urban design, you try to apply them where you can. This brings to my mind that my friend, Buckminster Fuller, who has great faith in man's future, a rare quality today, showed in one of his lectures his dome structures applied to whole cities and going down the scale of magnitude to a one-car garage.

I tried to apply general planing principles to the work that I have been doing for the campuses of Harvard, Boston, and Guelph Universities, where each building is conceived as part of total campus plan that is constantly subject to change.

Architectural creativity cannot turn its back to the urban environment. All of us, as architects, sometime tend to see our buildings as standing in isolation. This may have been more frequent in times past, but it does not meet the conditions of our urban environment today. In taking a broader view of buildings as parts of bigger complex, we will emphasize the ties of these buildings with other parts of the city and, in some cases, develop a simpler and more natural design. There has recently been a trend towards over-designing individual buildings with makes it very difficult to link them to other buildings that they have to live with.

I recollect that some years ago, while I was looking at an architectural magazine with Le Corbusier in his little cubicle at the Rue de Sèvres (2.26 x 2.26 x 2.26). He came to a project, looked it over carefully, and commented: "Lárchitecture moderne n'est pas si dificile que ça!".

There is more to this simple comment than may appear at first sight. We actually tend to see buildings through magazines where there are long write-ups carefully commenting on all

aspects of the particular building, but very often not showing us what the building does to he environment as a whole and how well or badly it fits into that environment.

To further stimulate creativity, the architectural schools, I believe, should not give problems that pretend to be "realistic" by meeting today's unacceptable urban conditions. This realistic approach, often based on the so-called "feasibility study", can prove very deceiving, as we consider the changing conditions in cities today. I rather feel that it is better to give the students a fresh start, giving more careful consideration to so-called utopias of tomorrow. At the rate of change and growth of cities today, those utopias are likely to become realities before the students leave their school. A fresh start, free of inhuman constraints, can make the creative process more natural and easy, and can finally result in a real marriage of creativity and technology.The "feasibility studies" of today are in for shock treatment, and I believe this treatment has already started. I have observed these conditions during my forty years' experience in many countries – under-developed, developed, and over-developed. I have witnessed many changes and have seen some of what we called "utopias" in the 20's materialize.

I have been involved in the last three years inlong, frustrating fights trying to apply the advantages of new technology to minds that systematically reject them. Building in New York City is a unique experience and a challenging one, but it is also an obstacle race against vested interests and accepted prejudices that sometimes prove insurmountable. To start with, the so-called "program of needs" is distorted by inflated land values and taxation and limited by zoning codes that have been conditioned to accommodate the needs of speculators. As a result, the land is over built.

I believe in compact planning and high densities, but the requirements of these programs go far beyond the acceptable limits. The program is further complicated when you have to comply with the ratio of one or more cars per family. When you get through trying to meet these conditions, you have something that is "financially feasible" and "marketable" but also humanly unlivable.

The questions I ask you here are: are such programs the road to creativity? or do they, rather, block the road? should such programs be given in architectural schools? My answer is NO. Why try to get young people involved in such efforts, trying to cope with unnatural conditions? I am convinced that we have gotten to such extremes and abuses in our cities that what is being done today will be rejected or swept aside in a few years. I also believe that it is more instructive and useful for the students to be subjected different experiences in architectural offices, and these experiences should be kept different. In an architectural office, they would be subjected to the so-called "realities of today", with not much view beyond the conditions now prevailing. In the schools, they should look beyond today.

There is also something else that I would like to recommend to schools that they should do in the first years of study of the profession. To stimulate creativity, the students should be forbidden to use the tools of the trade. No drafting boards or T-squares. No conventional orthogonal representation of plans, elevations, or sections. It is normal to teach children to speak before they learn how to write. What we do in the architectural schools tends to reverse that process.

I would suggest that you start work with your two hands by building volumes in the round conceiving spaces from inside out shaping these spaces for living and diverse human activities, considering the lighting of these spaces (as it is light that brings them alive) and then linking them by establishing connecting spaces that express the lines of movement and mechanical ties and making use of colors from the start to give them greater animation. This means developing your work in a three-dimensional model form before you do any drafting on the boards. In conceiving these spaces and forms three-dimensionally, you have to be at all times aware of their interrelationship, proportions, scale, and measure, and the resulting animation and degree of livability as the end results; the final test is what is really provided for the people using them. When you look at what has been done and before you get involved with the study and complexities of the great monuments of the past, it is healthy and helpful to have a good look first at what has been built for centuries by people anonymous and sometimes illiterate. Just study carefully the marvellous beehives that were some of our old towns settled around the world, from continent to continent, from Santorin to New England or Mexico. Those architectures were never put on paper. Neither were many forms conceived by Gaudi. With the tools at our disposal today, such as the computer, I would assume we can make great advances in this kind of approach that will open new roads to creativity.

I would like to warn you of the dangerous influences of architectural magazines, especially when you make use of them at the early stages of your research work and your creative process on a give project. It is better to refer back to them to establish comparisons when you have already arrived at a certain development in your work.

I miss in the carefully prepared program of this conference grater emphasis on the factors that influence the creative process by establishing limits and barriers at the very start. You may consider it part of the idea process, but if we consider idea and ideal in close relationship, we will become aware that the programs that guide and shape the designs very often a constitute a code of limitations. These limitations are many and different; some are natural limitations and can be a source of inspiration and simulation to creativity. They are what I would call the healthy limitations. We should not forget that "de-signare", in the sense we use it here means to mark out, to define, to limit, or to give form.

But, the limitations I am trying to emphasize here are the man-made limitations that are the consequence of the so-called "pragmatic" and "realistic" approach. These are based, only too often, not on land use but on land exploitation imposed by the rulings of buildings and zoning codes that have been recently made worse by redrafting them to permit "maximum marketability" of the land and buildings without due consideration to the resulting livability. These marketability factors are contributing together with the misuse and abuse of the private automobile, to the increasing disintegration of our cities.

The use and abuse of the private automobile in areas of medium and high densities in our cities (the so-called central sectors) present, with the consequent congestion and pollution, an unsolvable problem just as it is focussed in the Western urban world today.

The "oil crisis" may be a blessing in disguise if it makes radical measures a reality. It is through radical changes and the acceptance of new transport systems that our paralyzed cities can be salvaged from increasing congestion and the economic disaster it brings with it.

The USA at this most prosperous period, making use of the most costly measures to keep automobiles moving in peak hours, has been unable to solve or even correct the demands resulting from the increasing millions of automobiles tied up in peak hours in the best, most expensive expressways.

What is more than adequate during the rest of the 24-hour cycle (representing a sea of asphalt) is inadequate when the peak hours come.

To eliminate the peak hour system means a total reorganization of the 24-hour cycle. Alternatively, we have to ban the private automobile in the central sectors of cities. Since the end of World War II, it did not take much to see the urgent need for change. The moment of crisis is here.

Leonard Woodcock, President of The United Auto Workers Union said in February: "there are basic readjustment ahead for the automobile industry… they (auto manufactures) should be tapping the (Federal) Highway Trust Fund to develop mass transit systems. to develop a sensible mass transportation system of which the automobile is an integral part, but not the overwhelming –you know, we are so totally dependent,… for personal transportation on the private automobile, to the detriment of our society. We can't continue in this direction".

In the USA we have developed the two extremes –the congested town centers with mushrooming clustered skyscrapers that, likes rootless tress, are devoid of the corresponding infrastructure, and the sprawling suburbs. Both patterns lack balance and are devoid of a sense of community. Millions of people commute from one to another. The waste of energy, human or otherwise, is difficult to estimate. These two types of settlements are inhuman and irrational. They are a product of speculation that knows no limits.

As we are interested in giving our creative faculties greater freedom and new possibilities of trying to make the best use of technology as a tool contributing towards better living, we cannot overlook or ignore these artificial barriers that prevent happy marriage of creativity technology.

But, these barriers are man-made and, hopefully, can be removed by man. I believe that it is our duty as professionals to denounce the factors that are accelerating the process of chaos and decay that is only too evident in our fastgrowing cities.

Whatever advances have resulted from the new approach to architecture prevalent today are evident in the best examples of recent years. But, it is unfortunate and only too evident that the unprecedented urban growth of the 20th Century, in spire of many technological advances, considered as a whole, has given birth to problems of congestion, pollution, and disorder, that far outweigh the advantages that modern technology provides. This does not mean to be critical in any way to congestion, pollution and disorder. You are only too familiar with all these factors, so I will not elaborate further on this matter. The majority of us live in cities and have to cope with these conditions in our everyday life.

What I think is important is to take a stand as professionals to try as much as we can to correct these conditions in cities. I believe that our schools and professional organizations should combine the efforts first in analyzing the causes that have produced and continue to produce the decay of the urban environment. I feel this is a moral commitment that, as professionals, we cannot overlook or ignore. I would suggest that studies be undertaken in all schools of architecture and planning in a coordinated international effort exchanging information that will allow us to establish comparisons of the state of our cities in different countries around de world. In a very modest way, we started such efforts in the International Congresses for Modern Architecture (CIAM) back in 1993. Our findings at that time, though already significant, were nothing compared to denounce these conditions and, especially, the causes that have produced them. The young have the right to know under what conditions they will be asked to work. Creativity and the right application of modern technology will be measured by those conditions. We are all aware that these are matters that have deep roots, but it is better to know what we are all fighting against to try achieve a better and happier physical environment, which is what we are all concerned with.

The key to better living is a balanced community where the ratio of people to land and to automobiles permits a compact design where open and built areas are in correct relationship permitting their use, upkeep, and the mobility of the inhabitants with minimum stress and maximum enjoyment.
All activities find a natural setting, close contact are easy, and individual privacy is respected, the whole resulting in an urban pattern of living.

Influence of technology on architectural creavitivy *

Felix Candela

Undoubtedly the subject technology is the most transcendental one of the epoch in which we live, because our civilization has progressively and universally become technified, and in this technification, the causes of the crisis which the world is presently undergoing can be found.

Thus, the fact that the International Union of Architects is devoting this Congress to the examination of the impact that such a generalized phenomenon produces upon an

activity like architecture which is always an image of the culture in which its acts is extraordinarily opportune. This profession is changing substantially under the effects of this impact and we need to analyze its consequences and study its influence on our creative labor.

Although man authors who have dealt with this fact use the terms "technique" and "technology" as synonyms, interchangeably. I would prefer, at least in the frame of this discussion, to use the word "technique" in accordance with its dictionary meanings, that is to say, "the method or procedure –in regard to formal of practical details– or producing a work of art or carrying out a scientific or mechanical operation", or, "the degree of skill when the former is produced", and I should like to reserve "technology" to cover a wider and more complex concept.

Etimologically technology is "the study of practical or industrial arts", in other words, of techniques, and it is also a synonym of "applied science". The Oxford English Dictionary defines it as "the science of the application of knowledge for practical ends and the entirety of the means employed by a society in order to provide the objects of its material culture". This last definition is the one which comes nearer to the representation of the social phenomenon so magistrally analyzed by Jacques Ellul in his now classic book La Technique and also described, among other suthora, by Siegfried Giedion in Mechanization Takes command and by Lewis Munford in several of his books, but above all, in the last of them, The Myth of the Machine.

Unlike Giedion, who centers his study on the mechanistic aspects of the technological civilization, Ellul, as well as Munford, both affirm that technology should not be confused with the simple utilization of machines. The use of tools is as ancient as mankind and the use of utensils or arms which serve the purpose of extensions of his limbs or of his senses is one of the abilities in which he differs from the rest of the animal kingdoma Now can we say that the use of machine pertains solely to our epoch, since the distinction between utensil and machine is based simply upon the degree of mechanization which the former has reached.

Technology is, for both authors, the systematic rational and scientific way of facing up to collective problems of organization, regulation, control and supplying of human groups, as well as the efficient production of consumer goods for them.

The first significant examples of technological organization are found in the armies and labor structures for the large-scale public works of historic empires. Wars, roads, irrigation and drainage systems, temples or pyramids require the concentration and management of considerable labor units whose performance and logistical problems of privision, housing and transport of materials must be efficiently planned.

Technology is, in this sense a process of civilization or, to say the same, of renunciation of liberties or individual rights when the latter come into conflict with social objectives. The movement towards a free acceptance of norms of co-living and mutual support against the enforcement of laws by a more or less arbitrary authority, almost always depend on the magnitude of the group. The quantity calls for qualitative changes and what was once a kind of game or collective ritual becomes and arduous obligation.

I want to imply that, in the past, these processes came about gradually, providing the capacity of human adaptation with enough time to get in tune with the new circumstances. But now everything happens so remarkably fast, leaving many of us whether young or old, feeling frustrated or insatisfied when we must face changes in many aspects of society to which we are incapable of adapting rapidly enough.

In the thirties, Mumford, in Technics and Civilization, stated: "Mechanization and regimentation are not new phenomena in history, what is new is the fact that these functions have been projected and included in organized forms which control every aspect of our existence."

Ellul reaches a similar conclusion. What he calls "Technique" is the entirety of rational means in order to obtain absolute efficiency in any field of human activity. It is a sociological phenomenon of a totalitarian type which affects every factor of man's life and constitutes "the essential tragedy of a civilization increasingly controlled by it".

In both opinions, there is a reflection of the importance that the concept of scale plays in any qualitative valoration of social processes.

While diverse social activities become more complex, each one of them requires its own specialization and it is possible, consequently, to refer to the technology of construction, of medicine, of the automobile, of teaching or of the State, as partial aspects of a global technology.

The techniques or arts, as subjective and concrete phases of technology, originated in handicrafts and to no exclusively depend on the machine. Technique, as an individual attribute, is the ability to correctly and skillfully perform a certain operation; to do something "as God wills". "He handles his technique well" is said of he who performs his skill well, or "he has a very poor technique", of a performer who lacks experience or ability. It is then equivalent to the concept of art, in its most general sense as doing things well; the art of conversation or the art of laying bricks. The control over a technique or of an art is acquired by means of the creation of muscular or mental habits, after a period of training whose purpose is to attain the instinctive performance of the operation without the intervention of the conscious mind.

Everyone who has played some sport, musical instrument or, simply, driven an automobile, knows by his own experience –about the possibility if transforming into reflexes actions which mechanically performed– in other words, with machine-like perfection –a series of complicated operations which, in principle, when they are consciously performed, require a great deal of effort and completely absorb our attention.

But, no matter whether the operation requires the use of machines or real instruments, the learning of a technique, an art or a skill, it is an eminently personal act, since the machine which we put into motion is our intellect, the mysterious machine of subconscious.

With it we do nothing more than continue a natural process of involuntary learning which is begun at birth and, complementing inherited instincts, it permits us to adequately react to stimuli of the world around us and attend to without realizing it, vital physiological needs, freeing our attention from that phenomenal and necessary task, so that we can devote it to more outstanding ones. Nature is very careful not to rely on, in relation to these needs, our whimsical fickle conscious mind, and it entrusts everything which is really important as to the conversation of the species to a mental machinery which is to much more responsible and efficient.

But man is unique in that he is the only to use this mechanism for ends which differ from those which are purely physiological or necessary for our vital activity; in mystics, scientist and artists tell us about their experiences related to this process of training, "asquesis" or asceticism which, by stimulating the combinatory aptitude concealed in a recondite zone of that mental apparatus, it provides the key to the process of invention of the formation of new ideas, of creation, both artistic and scientific. Invention in Vivaldi's era, was a synonym for the work of art.

We see, therefore that techniques or arts, by means as an unexpected sub-product, the suprarational fruit of invention. Technology tends to attain the same objective of mechanization and of operations in the social body and, consequently, it should play the role of a collective subconscious and, taking charge of annoying and routine tasks to Ortega y Gasset, technology is "the reformation of nature in such a way that needs, if possible are canceled out because their satisfaction in no longer a problem". But he also clarifies that man's life "does not coincide, at least completely, with the profile of his organic needs". Man is an animal for which only the superfluous is necessary". Since technology is also concerned with the production of superfluousness, it thus becomes absolutely necessary for us. But everything has a limit, and perhaps the explanation of the present-day crisis resides in this questions concerning the limits between the superfluous which is necessary so that we do not lose our human condition and the uncontrolled super-production of extravagant superfluousness.

In any case, there is a substantial difference between both processes: the individual process and the collective process. The former takes advantage of a mental mechanism, acquired by means of a long, natural evolution which disposed of millions of years for its development, responding to imperative existential demands. This development presupposes and requires a relative permanence or a very slow mutability in the kind and quantity of said demands. In the latter on the other hand, society must hurriedly improvise a similar artificial machinery capable of responding, with adequate efficiency to the demands of social life. Bureaucracies, armies and professions are awkward attempts at satisfying this need, by education individuals whose specialization competes in a certain way that of the cells of natural organisms and permits them to competently perform differentiated and specific activities.

Nevertheless, the reduction of time which any process of evolution requires cannot be attained with impunity. The stages of readjustment of the organism, in answer to mew situations, require a certain amount of time before reaching the stationary stage of exact equilibrium the final objective of the process. The difficult experience of internal controls of growth is one of the most dramatic manifestations of this vital phenomenon of adaptation to the environment.

In the urgent search and eventual, though perhaps provisional, discovery of solutions to social problems which cannot be postponed, technology makes use of a group of specialized techniques which develops machines and more complicated methods, trying to create, at the same time, organisms which are capable of skillfully and efficiently manipulating them. But the introduction and use of these mechanisms bring about, in the short period during which they are in force, a series of fundamental changes in the problems which they are trying to solve. Their secondary effects after, and in a certain way, destroy the society whose performance it tried to regulate, transforming it into another unheard problems require the application of a new technology.

In this way a vicious circle, from which it is nor easy to escape, originates. Technology, as a systematic and scientific organization or any collective activity, should produce a static situation, an unchanging and hierarchic social order. However, as a dramatic contradiction, it becomes the principal instrument of change; the cause and effect at the same time, of the dizzying rhythm of growth which is characteristic of our time.

The advances of technique in medicine and sanitation, for example, in their praiseworthy attempt at preventing suffering and saving lives, have brought about the so-called population explosion, which is causing greater suffering and will produce –in the long or perhaps the short run– the loss of a greater number of lives, and society has not had time to simultaneously create a regulating mechanism of this unbalanced and abnormal growth. We cannot blame Medicine since its mission is not regulate society, but it is interesting to observe how different techniques, functionning separately, are producing cumulative results and giving rise to the same exponential growth in almost all fields of human activity.

At the present time, the world shelters a fourth of the total number of human beings which have existed since the beginning of history, In the last one hundred years, half of the energy used up by humanity during twenty centuries was consumed. From 1910 until today, the same quantity of minerals was extracted as during all the preceding millenniums, etc., etc.

We are well aware of all this and warnings like the conclusion of the Club of Rome only give a scientific tone to the obvious fact that, in finite world, unlimited growth is not possible. Nature teaches us that all organisms grow until they reach a certain limit in which they reach stability and equilibrium. The maximum size of animals or artefacts are determined, as Galileo pointed out, by elemental physical laws. Nevertheless, economists continue to cling to continuous growth, despite the catastrophic results which the application of this doctrine is producing, and industry cannot conform to a stable situation.

Within the emergency brought about by immoderate growth, a state of spirit whose principal concern is efficiency has been developed; the continuous search for improved and normalized means to attain, as soon as possible, any type of ends, without stopping to think if they are desirable or not. What was once esteemed for its intrinsic value is considered valuable when it assists in obtaining something else.

Thence comes the hypertrophy of services in any activity, without excluding architecture. The firm probably has more work in New York is Emery Roth and Sons which, though it does nor aim to produce a distinctive architecture, it does apparently control the secrets of the

mechanization of operations, as much in the projection as in the construction. Their cooperation is consequently, indispensable in any skyscraper built in the city.

The poet, Archibald Mc Leish, in an article entitled "The Great American Frustration" refers to the state of insatisfaction and doubt which predominates in that country, after the exhausting task of trying to understand an epoch which is less and less understandable. "The fact is", he states, "that all of us, as members of a generation, have lost control over human affairs and the possibility of deciding upon our destiny". "From the time of the beginning of the Industrial Revolution, a strange automatism, human in its origin but completely inhuman in its "modus operandi" and in its results, has been forcing itself upon us and things are done, not because they are necessary, but because they are possible". "The process is what predominates and directs, leaving the purpose or the human end to adapt itself any way it can in the product". "After Hiroshima", Mc Leish continues, it has become obvious that science is not hare to serve humanity, but rather "truth"; its own truth. What possible to know, must be known says science. What is possible to do, must be done, says technology."

An one-hundred story skyscrapers are built, cars and highways cover the earth, supersonic jets fill the skies, and the sea is filled with oil which escapes from the supertankers. And the atom is split, since all this is possible, and what then may occur does not matter. "The freedom of science and technology to create the kind of world which chance and the laborious effort of experts are making appear has been accepted as the basic law of modern life."

But who listens to poets –those foolish being who do not talk about practical things– in these fundamentally sane times?

You might say that all this has little to do with architecture. But architecture does not move in a vacuum and, among its duties, has always been understanding the society which it serves. We cannot overlook what is occurring in other fields and their effects is on our profession, nor reject the consequences which our work and the way in which it is carried out produce in social body. Let us not forget that construction, in whose way of operating we play a preponderant role, is one of the human activities which may employ a greater volume of non-specialized labor, and that the effects of a run-down industrialization with its aftermath of an exclusivist, unionist organization, could be disasterous in the "Third World", increasing the already distressing proportion of unemployment and unequal distribution of income which afflicts, not only developing countries, but also the super-developed ones. In the same way that the former admire and try to follow the example of the latter, underveloped industries, like construction, dream about the model of total industrialization without being capable of learning from another's mistakes.

The technological organization finds its typical expression in the great industrial corporation, whether private or state-owned. Technology requires the existence of these organisms whose primary objective is the rationalized, abundant and economical production of consumer goods or the supplying of public services. For reasons which are consubstantial to be operation of its own bureaucracies, that en soon becomes the ideal of unlimited growth, as much in relation to the volumn of production, as to the acquisition of economic an political power, favoring the concentration of capital and the control of resources and prices in only a few hands. When this growth surpasses the optimum limit, we obtain as a paradoxical counterpart, the inflexible and irreversible super-production, at an exaggerated cost, of goods and services which are no longer really necessary.

Since corporations do not trust individuals as such, they refuse to deal with them on a one to one basis and prefer to do business with other corporations. Consequently, our profession ten to become corporative in order to obtain corporative business.

Apart from the gigantic growth of the main architectural firms, which transform the architects which represent them into managers and salesmen, some years ago and taking advantage of the important consulting companies, the prototype of new professionals, came upon the scene. Armed with and impressive arsenal of computers and offering complete services –which include studies related to factibility, financing, programming, projection and construction –threatened to monopolize the market of important construction. The supposed advantages of the services which such corporations offered is based on a typically technological postulate; that the quality of a projection depends on the very detailed processing of information which embraces every possible factor related to the problem, on a detailed and quantitative analysis of its influence upon the solution, which is reached by way of eminently rational decisions and rigorous and scientific programming of operations which assure, not only perfect fluidity in the elaboration of the projection and execution of the construction, but also the maximum economy in the cost of inversion and, of course, a guarantee that the product will be satisfactory. A purely rationalist procedure, whose only counterpart is that the cost of previous investigation may, as a result, be superior to the theoretical economy which would produce the perfect solution. Since some of the architectural, engineering and construction firms acquired during their development have bought themselves back, recovering their freedom of action, we many suspect a possible failure in their activities attributed, without a doubt, to the inefficiency characteristic of their enormous size. It is quite probable that the budgets which are handed over to them are consumed in large part in the preliminary studies and sufficient funds to carry out the construction do not remain.

This economic inefficiency, which turns out to be paradoxical in institutions whose only apparent merchandise is an effective service, is our only hope of competing with them as individuals, in spite of the limitations which are characteristic of our modest conditions as human beings.

Every organism, when it grows disproportionately becomes awkword and clumsy. Within gigantic corporations grow monstrous bureaucratic organs and their huge general expenses in internal services, control and promotion disproportionately burden production costs. The final result is that exaggerated industrialization is almost always antieconomical. The worst of the situation is that it seems impossible to image an industrialization which does not end up being exaggerated.

Apart from the political system, any technological organization, once established and running, acquire its own life and continues to operate inertly even though its services are no longer necessary. The arms race and the nightmare of the automobile are tragic examples of this phenomenon, because apparently, the world economy would collapse without the super-production of these two goods.

I always recall a statement by Pedro Ramírez Vázquez, who, when I praised the organization which he had set up for the Olympic Games in Mexico, said: The difficulty is not to establish an organization, but to plan it and at the same time –get rid of it when it is no longer necessary."

Another characteristic of the technological world is its eagerness to quantify everything, in the illusory persecution of exact analysis and precise statistics. The use of modern mathematics –that marvelous intellectual toy– in the observation and analysis of natural phenomena was so surprisingly successful that it made us believe that with the simple application of mathematical reasoning, we would be able to discover absolute truth; to be familiar with reality in its entirety by way of rational deductive and lineal processing of information.

The discovery of a new toy, the computer –which in Europe is uncontemtuously called an "ordinater"– has provided a new stimulus to this quantitative phase of our evolution. The number, perfect and unchanging, holds –as it did for the Pythagorean community– the secret of all things.

We often forget, however, that the rigor of the mathematical reasoning and the velocity of numerical manipulation of machines cannot guarantee us the exactness of the result of its application, because our starting point is always an original and arbitrary assumption, an hypothesis of doubtful certainty, since it depends on our imagination and our capacity to create irritates the technologist who cannot tolerate, in principle, imponderables. Thus, rationalist theories in every order of thought, even in politics, arise. Rational becomes as synonym of quantifiable and it is not worthwhile to concern oneself with all that which cannot be measured such as feelings, morality, beauty or art.

If, in spite of everything, we must keep on taking these bothersome imponderables into account, we must inevitably give them a numerical value so that machines can operate whit them. Thus numerical theories of proportions or colors are developed and their objective is to attain logical methods or infallible and rational rules which unburden us of the task of composing or providing a definitive form for a building or a painting and, in the end, which relieve us of the difficult task of thinking. In two books recently published by M. I. T. Press, N. Negroponte studies the possibility of designing, that is, of inventing architecture by way of computers and he joyfully predicts that architects will not be necessary in the very near future. The dream of rationalists has at last become reality; the complete mechanization of the task of designing or invention and the elimination of man, as an annoying and unforeseeable element, if the task is going to be purely rational.

Industrial corporations, in their records for "investigation and development" begin from the assumption that such an irrational task as invention can also be quantified and they estimate beforehand the cost of a determined discovery considered necessary or advantageous in order to improve the process of production. Of course, real inventions, which could be revolutionary and perturb the establishment are not being dealt with, but rather, perfecting the existing process.

The concept of investigation or research is relatively new. In other more ingenuous times, the word "meditation" was employed. Investigation implies that the solution to any problem exists beforehand, and it is only necessary to search for it. It is therefore one of the manifestations of an attitude of arrogance opposite the world which is characteristic of the technological man. The latter believes that everything can be bought; that nothing is impossible, if a sufficient amount or money is devoted to the ask. This arrogant belief is nothing more than the natural consequence of a generalized ignorance produced by specialization, the explosion of knowledge and of information.

The other day, I read, with great alarm, that the volumn of human knowledge, following the same exponential curve which represents many other phenomena of our epoch, is doubling in less than thirty years. I suspect however, that these statistics are based more on the pure volumn of apparent information than on the actual existence of unknown knowledge.

This suspician is shared by some men of science who insinuate that creativity in the field of science underwent its apogy and began to decline at the beginning of this century. What followed was a state of purely derivate and perfectionist evolution. As a consequence of the industrialization of science and the bureaucratization where it is produced –that is, universities, research centers– the innovations to be expected are also bureaucratic, in other words, incremental and elaborative; mere technological developments of a few fundamental previous ideas.

Nevertheless, it can be proven that the volumn of scientific and technical publications continues to increase exponentially and that this may have confuse the statisticians who, though they know how to count do not necessarily know that they are counting.

In any case, overwhelmed by an avalanch of paper which we do not even have time to thumb through, it is more and more difficult to acquire what our grandparents called "general culture", (today the word is no longer in style) and we live isolated in the minute world of our speciality, our decisions depending on what other experts want to tell us about what is happening in their fields. The architect has become an expert in finding the very best expert of each technological problem.

But we cannot always trust the opinion of the experts. In a technological society, the dominion of a technique is a valuable merchandise whose possession it is not wise to freely share. Scientific and technological units, whose primitive and declared missions was the diffusion of knowledge, has been transformed into closed groups which jealously hold on to their secrets. Two smoke curtains are used for this: esoteric and unintelligible language for non-beginners and the indiscriminate proliferation of written material, largely unsubstantial and repetitive. The latter is encouraged and sponsered by the system in universities of graduation and promotion, since the number of publications –not necessarily their quality– is the yardstick by which the value of any candidate for a position in the academic register is measured. Oppenheimer, referring to Physics, often said that to continue writing about it at the same rhythm, in less than one hundred tears, the weight of the paper need would be grater than the weight of our planet.

The possible solution to this paradox because of miniaturization or electronic storage, does not affect the postulate which states that an excess of information is just as effective as the lack of it to impide the access to knowledge.

With this stored away in watertight compartments, and with no one seriously concerned about the imperious task of cutting away the underbrush in the scientific and technical forest –of skimming away essentialities, as Ortega said, each profession sets up its own objectives, without taking into account the effects that its activity may cause in others or in the entirety of the society.

We know less and less about more things and we have reverted back to a magical society which again believes in the miracles or the witchcraft of our new scientific culture.

What we do know without having to resort to the experts, is that energy more and more costly and the tendency is to continue it in growing quantities, that the world population continues to increase and the vital space begins to shrink, and that food begins to become scarcer, with disasterous results in many areas of the world.

On e thing is obvious. Modern technology consumes an enormous amount of energy, since industrialization is based on the replacement of man with a machine, or, to say the same, natural energy with artificial energy. The green revolution or industrialization of agriculture depends, almost exclusively, on oil for fertilizers, tractors and irrigation. Its secondary effects affect our profession, since it brings about the emigration of the rural population to the cities and the abnormal growth of the latter, transforming city planning into a hopeless task –practically limited to providing facilities to the automobile–, since basic decisions are not under their control. If extrapolations were correct, Mexico City would reach a population of forty million before the year 2000. It now has more than twelve million and each one of them aspires to own an automobile. Paris had two million automobiles five years ago. Half of them enter the center of the city every day it is predicted that there will be four million vehicles before the year 1980. Are they perhaps considering the razing of the city and its transformation into a system of superhighways and parking lots? Apparently the task has already begun.

Architects boast about the construction of factories and airtight skyscrapers, with artificial lighting and atmosphere, even in benign climates. The World Trade Center in New York financed with the assitance of the New York Port Authority when the city electricity than population of one hundred thousand inhabitants.

The industrialization of food products, concerned with treatment packaging and distribution of them, considerably increases its intial cost and implies a proportional decrease in its quality. The super-developed countries eat worse than others, but in greater quantities and with an extravagant additional consumption of energy.

We would have to begin to ask ourselves if it is licit, moral and, in the end, practical to continue to waste natural resources, with deteriorating results on the environment and general wellbeing, in order to stubbornly maintain a mistaken industrialization because of the simple fact that it is expensive.

It would not be extravagant to replace our present-day arrogance with a certain dose of humility and a consciousness of our limitations and become resigned to accepting the fact that many of our problems have no technological solution. The only alternative is not to provoke them.

Nevertheless, the generalized belief is that the cure for all the evils that technology has brought about is more technology. But no an existing technology, but rather, another one which is to come and which depends, at the same time, on new scientific discoveries that we confidently except someone to make for us. If oil becomes scarce or gives out, someone will have to invent undoubtedly new forms of energy which will allow us to keep on destroying what remains of this poor planet, like incorrigible spoiled children. In the innumerable recently published books and articles on the energy crisis they carefully avoid any reference to the most obvious root if it, the superproduction of unnecessary and even harmful objects and, as a consequence the subproduction of basic goods. The preferred cure of the experts to solve the crisis is the tremendous investment in research to discover new and miraculous forms of energy. This should not surprise us, since the experts would profit immediately from this affluence of funds. But no one dares to propose serious means to reduce this waste which, though it apparently seems to be a sensible solution to the problem, it would go against the popular cravings encouraged by an irresponsible commercial advertising, and it could jeopardize the interests of industry, labor and the military, and it would not favor the scientific and technological community whose economic subsistence depends on them. In the United States, an incredible law which is apparently exempt from control prohibits cargo trucks from carrying cargo on the return trip is still in force.

One of the lesser manifestations of the reasurgence of the culture of magic is the popularity and publicity enjoyed by visionaries and prophets of futurist architecture, who, leaning on childlike technological extrapolations offer us unusually gigantic projections, which reveal an arrogant contempt of inexorable physical laws which limit the size of natural organisms and rule the behavior of artificial structures, prohibiting arbitrary changes in the scale. Gratuitous contempt of course, since there is absolutely no danger of seeing their fantasies constructed. At the bottom of one of these intrepid sketches, reliably published several years ago, in a well-known architectural magazine, I read an astonishment unexempt from indignation, that the imminent discovery of antigravity would facilitate the construction of the embryo.

In the past, these predictions were left in the hands writers and cartoonists and no one took them seriously, as today with science-fiction novels. But, lately, futurology has acquired a scientific varnish and the extrapolations of the experts is based on a sophisticated methodology, to which the use of elaborate statistics and computers confers a respectable aspect.

In the book "The Year 2000", a scientific study of the future by Herman Kahn and Anthony Wiener, published in 1967, there is a description of the "models" or probable combinations of tendencies and development based on causal relationships between different variables which may have an effect on the future. In a few years, the optimist models which are described in detail of a post-industrial society, whose principal problem would be to discover something to do in the free time that machines had provided, have become a sad reality of unemployment, hunger and scandalously unequal distribution of wealth, which is producing a very serious polarization of humanity. What all these decisions do not usually take into account are the secondary consequences of the abuse of artificial forms of energy, and the need for radical changes in the premises on which our social organization is based so that such prophesies have some glint of truth.

But apart from futurist nonsense –with no importance other than the disorientation that it causes innocent young people– architecture and construction in general are activities which have traditionally resisted technological innovation and industrialization except when the latter has been forced upon them by governmental decisions or encouraged by an artificial scarcity of labor.

In the field of construction, only the sector of public works can be said to have reached a degree of mechanization comparable to that of other industries. Construction continues to be carried out manually. In the United States –the most technologically advanced country– one-family houses are still largely constructed with a procedure similar to the one improvised by the pioneers
and the attempts at prefabrication
on a large scale have been a notorious failure. Apparently, the justification of this fact is economic and in that country
it is affirmed that manual construction turns out to be cheaper that industrialized construction in spite of bureaucratic restrictions for the employment of non-unionized workers and of the scandalous cost of labor, artificially brought about by powerful unions, whose legitimate mission of protecting the working class has been transformed into the defense of antisocial privileges for exclusive groups. The salary of a unionized carpenter or electrician is superior to that of an engineer who supervises a building and, of course much greater than that of an architect employed in an office.

Prefabrication or total industrialization can only exist in a market controlled by protectionist measures which guarantee demand and prohibit the competition
of other alternatives, and in a stable society, unaffected by fluctuations in the availability of labor. Otherwise, the substantial and irreversible investment in machinery, the crew and organization could not be justified. Since we do not live in a stable world bus just the contrary, we must be careful in our choice of what to industrialize and avoid decisions which prevent us from turning back if it should be necessary.

Fortunately, because of an accumulation of fortuitous reasons, construction in Westerncountries and, of course,
in the Third World, is an underdeveloped industry, which puts a large part of humanity in a situation which is favorable in order to choose the kind of the technology
and the proportion of industrialization which is more advantageous,
not only for our activity, but or society in general.

We need a more flexible and economical technology that the corporative one.
What someone has called intermediate technology which does not exclude man, but which provides him with simple
instruments which lighten his task without eliminating it. There are certain elements in construction which must be industrially produced, but which would be advantageous for their incorporation in buildings
to have sufficient flexibility to avoid the monotony of the unique solution and their inclusion could be carried our by unspecialized workers, facilitating
their use in the popular dwelling which should be produced by its own users.
And I am not referring exclusively to the production of housing for the masses with little acquisitive power, but also the housing for the middle class, whose free time could be devoted to the manual labors of construction, if we place at their
disposition elements, materials and
simple instructions necessary for this task and we lighten the legal obstacles
which raise problems in freely carrying this out.

In a super-populated world and facing an economy of scarcity and frightful unemployment, the objective of our industry cannot continue to be to use labor sparingly by wasting energy.
The corporative industry, whose existence is justified by such objectives, promotes unemployment,
the concentration of capital and goods in a few hands and its management by an unfeeling and arrogant bureaucracy.
The interest of this industry are confused and mingle with those
of society which it should be serving and know longer knows if the survival
of General Motors or our own is more important.

In the arduous and inevitable transition from an economy of artificial abundance and waste to another of scarcity of raw materials and energy, the task of this Congress should not be limited to a simple dialogue un the best way to adapt to a situation forced upon us by an uncontrolled technology, but rather, agree on the foundations which help us determine reasonable limits of the growth of our activity and the dimensions of it products, and to discover what are the characteristics of that intermediate technology which permit us to make technique again acquire its lost category as art.

Perhaps, with this, we could contribute to avoiding the ominous disappearance of the individual or group workshop, which faces the inhuman, bureaucratized factory of projections and to conserve the joy of producing; the pleasant "amusement"
which is reflected in works by
Haydn or Vivaldi and in Maillart's bridges, without which creation
is a tedious task and life is almost nor worth living.

I am very sorry that the elemental consideration of space acceptable in a presentation of this type and my scarce experience in the field of industrialized architecture have forced me to refer
only in passing to specific problems of the technification of the latter.
Others will undoubtedly do it more competently. But, at least we are
prepared to face, individually and collectively, the catastrophic universal
consequences of the technological phenomenon, the discussion of
our small domestic problem may, as a result, be intrascendental.

*** Lectures given at the 12 th Conference of the VIA (Madrid, 1975).**