

## THE INVENTORIUM

The Inventorium is just part of the vast Cite des Sciences et de l'Industrie at la Villette in Paris. The entire project has some spectacular architectural features and a correspondingly spectacular budget.

The Inventorium is intended for children up to the age of 12. But the article here is not just about creating exhibits for children; there are observations on visitor behaviour that are valuable for any interactive exhibition, particularly on the use of helpers and the function of labels. The Inventorium, as described here, is in many ways a brief for a small-scale science centre since a whole range of activities are described which have relevance to setting up any new project. There is some debate amongst science centres as to whether exhibits should be aimed at just children or whether all visitors should have access to the same exhibits, leaving the level of interpretation to the visitor. Gillian Thomas' article discusses the advantages in creating an area specially for children.

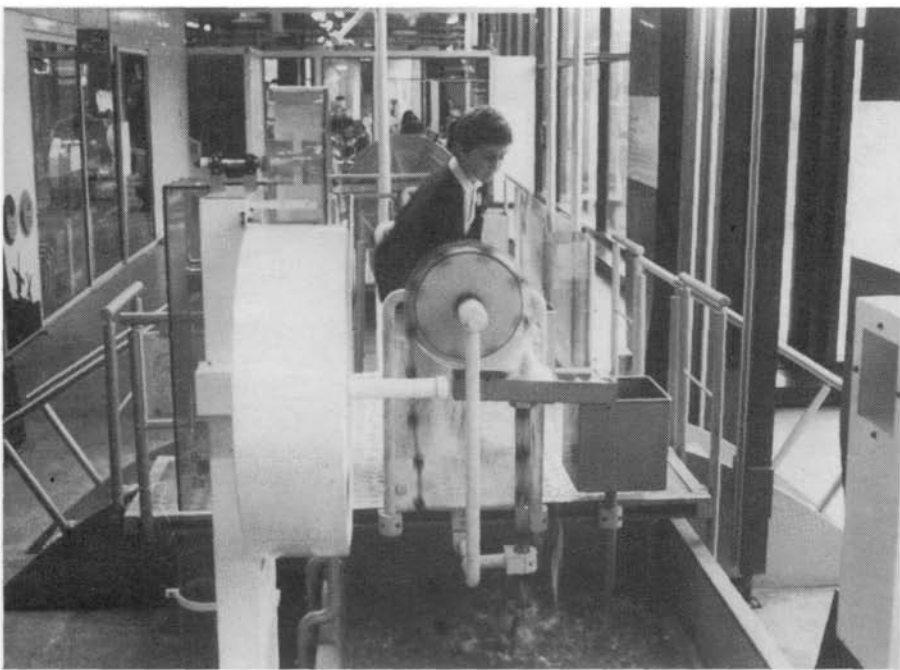
Location:	Cite des Sciences et de l'Industrie, la Villette, 30 Avenue Corentin-Cariou, 75019 Paris, France
Date opened:	14 March 1986
Floor area:	1800sq m
Number of exhibits:	120
Number of staff:	21 full time 10 part time. They are also involved with children's activities throughout the centre
Number of visitors:	200,000 p. a. Approx 55:45 child:adult ratio
Opening times:	Tues, Thur, Fri 10-5 Wed, Sat, Sun 12.30-6.30
Entrance fees:	Children FFr15 Accompanying adults free Groups FFr12

# THE INVENTORIUM

Gillian Thomas



Gillian Thomas is at present the Head of the Inventorium, the exhibition area specifically created for children at the Cite des Sciences et de l'Industrie, la Villette, Paris. She had been working as a member of the development team for the previous five years before the opening in March 1986. Particular interests include the interactions between adults and children and introducing technology to the general public.



*Exhibits at the children's 'Inventorium' at the Parc de la Villette, Paris.*

During the past four years a team of people including scientists, teachers, designers, architects, graphic artists and psychologists have been working together to develop the children's space, known as the Inventorium, at the Cite des Sciences et de l'Industrie, la Villette, Paris. An area of 1750sq m is provided for children divided into two areas, one for the 3-6 year olds, the other for 6-12 year olds.

We have been fortunate in that the French government had made available sufficient funds to allow for a period of thought and discussion before development began. This led us to consider in detail what is the purpose of a children's space and what are the special opportunities it offers. During the last few months since the opening in March 1986, we have been able to observe the reactions of the public, both children and adults, to the project. In this article I wish to discuss some of the reasons for justifying the existence of a children's space, the criteria which define it and to offer some practical guidelines for setting up such a project.

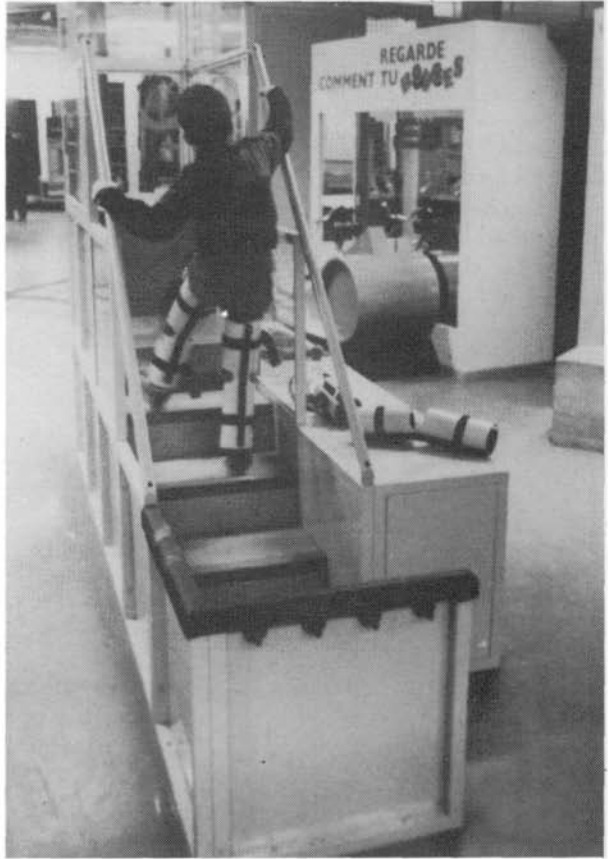
### **The advantages of a children's space**

Children make their presence felt in any public area, particularly by their noise and mobility. In exhibitions, they frequently crowd to the front and monopolise all buttons, knobs or levers. They may not, however, be benefiting greatly from the experience. Most exhibitions are aimed at a reading age of 15 or above; this means that any junior school child will only have a vague idea of the content presented. The parents often act as interpreters but since the message is not specifically aimed at the child it may be of little interest or value to him or her. In contrast, a children's space chooses topics of direct interest to children and at a reading level adapted to their needs.

In a mixed group of adolescents and young children it is generally the adolescents that obtain access to an exhibit. The smaller children tend to be discouraged or worried; they give up and go away. This problem is not entirely overcome by eliminating the adolescent; the ten year old may well push away the five year old. However, the ways of treating objects seems to be reasonably coherent throughout the primary age range and the differences in size and force are less extreme. A children's space allows the younger child to carry out his explorations at his own rate, unharrassed by the presence of adolescents.

By defining the space as being specifically aimed at children, the role of the adult is changed. He is now the helper, the accompanying person, a secondary individual. His

*How your body works:  
if your knees are  
locked, can you still  
climb stairs?*



attention is focused on the child and on trying to make the exhibition work for him. School groups also find such exhibitions better adapted to their needs, as the necessity of interpreting the material is reduced.

Many parents will do things for their children that they would not dream of doing for themselves. Adults who would never come to a museum on their own will often do so either at the request of their children or because 'it's good for the children' like the swimming baths or a seaside holiday. A children's space has readier access to the media; magazines and TV programmes aimed at this age group find the topics pre-digested for them, they make greater use of the museum and this provides good free publicity. In this way it is often the child who asks to come, bringing an otherwise wary adult into contact with the museum or science centre.

## The characteristics of a children's space

Three main features characterise a children's space: the public, access, and the presence of helpers

**1 The public** A children's space is defined in particular by its target public. Children are generally considered to be under eleven or twelve. In most countries this coincides with the end of primary schooling. For some activities, a lower age limit may be necessary. For example, it may be a good idea to exclude the under five's if a certain degree of reading ability or concentration is required. These limits should be clearly stated so that adults can quickly identify if the space is adapted for their child. The adults accompanying the child are an integral part of the public. They should be encouraged, as they can help the children where necessary and reduce the need for paid supervision.

Pricing policies can be used to regulate the proportions of adults to children. In order to encourage the adults to stay with their children, we offered free entry to parents, only the children had to pay. Since parent in French means any family member, some individual children were accompanied by up



*The children's building site for 3-6 year olds. Even small children enjoy working with little adult interference.*

to five devoted relatives. This seriously reduced the number of children able to gain access to the space. We have now reduced the number of free entries to two per family.

**2 The access** A children's space needs a controlled access in order to verify that the public correspond to the stated criteria. It also makes it possible to control the number of people present in the space at a given moment. This can be done by automatic turnstiles which measure the numbers of entrances and exits, or by a system of badges or sessions.

If possible, it is preferable that the public should be allowed to stay as long as they like. A visible indication, such as changing the colour of the badges every hour makes it possible to suggest to the public that their visit might be nearly over without making it necessary to ask people to leave. If the public has paid for entry to a space they have the right to expect a certain level of accessibility. While visitors will self-regulate, we have found from experience that most breakages occur when a very large number are present. This is obviously due in part to increased usage; none the less, the manner of interacting with exhibits when the place is



*Some parents believe that science education should start when children are very young.*

crowded tends to be different. The child or adult, conscious of being watched and of having a limited time available before someone else claims a go, tends to use the exhibit more roughly, looking for a quick effect, before moving on.

A controlled exit is also necessary for a children's space. This is less of a problem at weekends and during school holidays when the children are, at least theoretically, under the supervision of their parents. Most parents are capable of keeping an eye on up to four children although they may not wish to do so. Teachers and their helpers have, on the other hand, up to ten children to look after. If the teacher cannot be sure that none of his children is going to get out of the museum or science centre, he is unlikely to allow much in the way of free exploration. This may be more of a problem in France, where children are less used to autonomous activities.

Undesirable adults are more readily excluded with a controlled access. Teachers or other interested adults can generally give some proof of their involvement in a child or museum-related field.

**3 The presence of helpers** The presence of helpers is an important element of any children's space. These may be skilled professionals, student workers or volunteers, depending on the budget and the kind of activities proposed. The necessity for such help may seem less evident during the weekends and school holidays when the children are part of family groups. They can, however, help to reassure adults, and enable them to make sense of the scientific content, both for themselves and their children. With school groups they help teachers to make use of the resources and reduce anxiety about the group behaviour.

The precise role of these helpers needs to be clear, both to them and to the public. Some of their tasks may include checking the working order of the exhibits, carrying out minor maintenance, controlling access to popular exhibits, asking questions to encourage children in their investigations, answering questions, doing small demonstrations and controlling entrances and exits. These tasks are probably not all carried out by the same person; volunteers will, in all probability, have a different role from paid staff.

The number of helpers necessary depends on the type of activity involved. Some kinds of hands-on exhibits work with very little need for outside help. Other activities such as handling collections and live animals, require a considerable degree of attention if the collections are to last and the



*Entrance is free to parents and they are actively encouraged to help their children by reading labels and explaining what is going on. Indeed, adults account for nearly half the visitors. Helpers are at hand, though, throughout the exhibition if needed.*

animals not to suffer from nervous breakdowns. The numbers vary from about one helper for every 300sq m (3000sq ft) for free-access exhibits, to one helper for every five children, as has been recommended for some discovery room type exhibits. Thus a clear estimation of the resources in personnel needs to be made before deciding on the kind of exhibit or activity to be offered. It is important to have sufficient staff present so that they do not feel threatened or overwhelmed either by the numbers of children or the amount of jobs to be done. Some things always go wrong in a children's space; exhibits break, children are sick, they lose their parents, fall over or swallow bubble mixture. The presence of a smiling adult is remembered more than the exhibit that did not work.

### **The choice of exhibits**

In theory, any area of science or technology could be made interactive and adapted for children. In practice, a selection has to be made both of subjects and of the specific topics within a subject. Several criteria can be proposed. First of all, it should be enjoyable. Children want to learn when it is fun, they do not have a masochistic pleasure in finding out about topics which seem to them boring. Thus the first priority is that the subject, whether presented as an interactive device, a moving model or a static display, should interest the child sufficiently so that he will stay long enough to carry out some further exploration. This could include:

- Sensory motor exploration:  
he looks, watches, touches, smells etc.
- Technical manipulation:  
he uses a technical object, microscope, camera, telephone, etc.
- Experimentation:  
he changes one or more variables and observes the results of his actions.
- Role-playing:  
he adopts a role proposed by the exhibit, he becomes an astronaut, a miner, a factory worker.

It is probable that most exhibits will emphasise just one of these categories and that none will involve all four. Classifying the main interest of an exhibit is one way of checking to see that a good range of possibilities is available. However, children have a strong tendency to adapt a situation to their current needs. A small child may be more interested in the pebbles used to surround an object than in the object itself;

an array of switches can be immediately converted into an astronaut's control room. Providing a wide range of types of exhibits will reduce these problems, but will not eliminate them.

The category 'experimentation' needs to be clarified. Many good interactive exhibits present counter-intuitive situations, when the ball rolls uphill, a metal object is suspended in mid air or a small fragile-looking object is found to be too heavy. Such exhibits invariably cause adults and older children to initially laugh, and then to begin an investigation. The unexpectedness of the reaction of the exhibit causes a shock which disturbs the status quo of existing concepts and allows the visitor to think again. This is not necessarily true below the age of six or seven. A child or four or five can see no reason why a dog should not have five legs, or why an iron ball should not float in mid-air. These would be just two more events in a seemingly unordered world. Thus it is important to provide sufficient concrete experiences that will allow the child to build up his concept of a rational world.

Having chosen some area which is important in science or technology, there is no need to be exhaustive or to cover in depth all the aspects. Some topics can be readily presented as interactive exhibits, others are better treated as films, books or graphics. Linking themes help adults to make sense of an exhibition. Most children do not worry about such theoretical concerns, they are too busy finding out by doing. Giving a few simple phrases describing the content will reassure an adult, and particularly if there are interesting graphics, can lead to a discussion between the parent and the child.

Finally, no exhibit can be considered a success if it does not foster a sense of wonder and delight in the beauty of the phenomena of the natural world. The aesthetic appreciation of a phenomenon entices the visitor to investigate. Such a hedonistic approach to teaching science and technology should not be denigrated. The public, both adult and child, is solicited on all sides by appeals to their senses to buy goods and services. As much attention should be devoted to selling science as to selling soap powder - the exhibits merit the best support that can be offered.

### **Types of exhibits and activities**

Three main types of facilities are, in general, offered in a children's space: interactive exhibits, resource centres, and workshops.

**1 Interactive exhibits** These exhibits, on free access, allow the child to develop his investigations at his own speed. The child chooses both the subjects and the order in which he explores them. This is rarely a conscious decision, it is strongly influenced by the contiguity of the exhibits, their apparent attractiveness and their availability. The amount of time spent on any exhibit is also chosen largely by the child although tired parents often drag a child away. This area of autonomous activity is the central part of the children's space. It enables the child to find a topic adapted to his needs and provides an easy introduction for those who lack confidence or think that science is not easy for them.

The free access space can also be used for group activities around a theme, or for small-scale theatrical presentations of a technique or historical topic.

**2 Resource centres** The resource centres contain a wide variety of materials which provide back-up materials for topics introduced in the free access area. The interactive exhibits often largely present techniques or scientific principles out of context. In the resource centre, the other aspects of a topic can be presented by films, slide shows, books and data banks. Collections can also be offered, often in the form



*Children like to make a physical effort: here they can send messages by pneumatic tube, sitting on the pouffe to compress the air.*

of boxes or drawers where a selection of objects are presented for the child to look at and handle, accompanied by a small amount of written information.

Adult help is needed in this area, both for the child to make sense of the information and to look after the safety of the objects. Nevertheless, all the materials should be designed so that they can function as much as possible without the intervention of an adult. While it is possible to present films in the same area as the free access exhibits, the excitement and noise generated by the latter make it difficult for a child to concentrate.

**3 Workshops** A workshop programme offers organised activities, on specific topics for a stated length of time to a fixed number of children. These topics may be related to subjects presented in the free access area, in this case they allow the child to develop his investigations by experimenting with a more flexible material which cannot be left on free access without risk of breakage or loss. Such material ranges from disposable items such as plastic bottles, plates, used biros etc, to scientific equipment such as microscopes, balances, light boxes or lenses. In the workshop more varied use can be made of the material and it can be adapted to the particular needs of a group or an individual. It

*Water can do work. In this case flowing water turns a water wheel to lift a child.*



also provides more time for questions and verbalisation of ideas.

A second use of workshops is for the staff to develop topics which are not yet on free access. Running workshops enables staff to find out about children's ideas on a subject and to see their reactions to particular experiments. Workshops need not be restricted to children; groups for parents and children together can often be a success. They are also a reason for a child to come back for another visit.

It is important to consider what other back-up facilities should be available. The well-being of the parents is an important component of a successful visit. Many parents feel uncertain both about the subjects presented and their own role. Written material can help - it gives the adult something to do, it leaves the child free to investigate on his own and also provides a basis for discussion between parents and children. It can help the adult both to feel that he understands the topic and to guide him in how to treat the topic with his child. It does not need to be apparent that the graphics or worksheets are mainly aimed at the adult. Simple questions, a brief statement of content will suffice. Most small children tend to ignore written material unless it is specifically brought to their attention. Thus even graphics specifically aimed at the child will tend to be first read by the parents.

The bodily as well as intellectual needs of the public should be considered. Adults have less stamina than children; a few carefully placed seats will allow a parent to recover and prevent an otherwise happy child from being dragged away unwillingly. Drinking fountains, baby changing rooms, backpacks or lightweight pushchairs are all minor assets which change the public's impression of the degree of care offered. These factors may have little to do with science education but they have a considerable influence on the visitors' desire to come back.

## **Conclusion**

It is possible in this article only to discuss some of the aspects involved in creating a children's space. The actual process of exhibit development, the ergonomic problems and the special difficulties associated with evaluating children are all issues which need to be considered in detail. However, the same guidelines apply for developing facilities for children as to any other age group of visitors; it is essential to begin by defining the target visitor and his needs before developing the exhibits. Children may well be adults soon enough; for

the moment we must be aware of their difficulties and preconceptions, while enjoying making use of their imagination and enthusiasm.