THE ROLE OF COMMUNICATION IN REFORM IN THE USE OF ENERGY IN BUILDINGS

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1. Summary
This paper argues that, depending on the circumstances, regulation, innovation and communication are all appropriate approaches to the issue of energy and buildings. In some cases, regulation is possible, advisable, and maybe even essential; in other cases regulation is inadvisable, and provision of information is the only viable course of action; in other situations, neither is appropriate, and we have to stick to the drawing board and conduct research until better alternatives are forthcoming. Some guidance is provided for deciding which approach is appropriate, and the Solar Energy Information Centre in Western Australia is described as an example of a new approach to the provision of information.

2. Review of objectives
It is apparent that there is a diversity of objectives on this issue. Some parties put a premium on reducing environmental costs; others on reducing recurrent costs; and others on improving comfort and amenity with a reduction, or at least a stabilisation of recurrent and capital costs. This paper will focus on the Building Regulation Review's principal objectives of reducing costs in the context of energy consumption in buildings.

3. Life cycle costing
It is important to consider the total life cycle costs associated with energy in buildings, including both recurrent energy consumption costs and intermittent capital costs associated with energy consumption. In many cases these capital costs that can be avoided or significantly reduced by careful designing and planning from the outset. It is counter-productive if the capital costs are reduced by reducing block size, and it is then impossible to site the building to benefit from winter solar access and avoid summer solar gains. That is not to say that reduced block size is not compatible with energy usage objectives- but it does mean that care must be taken to ensure that these opportunities are not jeopardised.

The financial value of energy conservation can be evaluated in many different ways.

The following are some basic rules of thumb:

- Every $100 of energy saved is equivalent to about 0.1% in interest rates on an average house mortgage ($50 000 over 25 years at 15%).

- The net present value of every $100 per year of saved energy is about $500. For example, an average $300 per year saving over 25 years is equivalent to investing $1500 now.

To the saving of $1500 in recurrent energy costs must be added the cost of extra capital items required for a poorly designed house, such as space heaters, shading devices, curtain linings, slow-combustion heaters, package air-conditioners etc. This may be as much as $5-7000 in present value on an average house, most of which is avoidable.

A further significant cost, which is rarely considered, is related to the level of utilisation of the various spaces in the house. In a house with poor thermal design, it is common for occupants to crowd into the few rooms that have been made comfortable by artificial heating or cooling, leaving uncomfortable rooms under-utilised. Good thermal design can make all of the house habitable at all times with very little recurrent energy cost. Providing a strict financial analysis of this situation is challenging; however, the net result translates into the possibility of well designed houses actually being smaller, with a consequent reduction in capital costs. At present construction costs of about $500 per square metre, a saving of some thousands of dollars on an average-sized house is conceivable.

In summary, good thermal design may effectively reduce the net-present-value cost of a dwelling by as much as $10 000. This is a goal well worth attaining.

4. What to do- regulate? communicate? stimulate?

Communication

To understand the role of communications in this problem, one must go back to first principles. The first lessons in communication theory emphasise that communication requires both a transmitter, a receiver and a common language, as well as a data signal (message). There are immediate lessons here:

First, we experts may be enthusiastic and versatile transmitters of our signals; however, we cannot take it for granted that the public are well prepared receivers. Often, they are neither switched on, or tuned in. Simply, ours is a rather complex message, about which we have not even attained agreement among ourselves. In such a case, it is unreasonable to expect a whole-hearted reception from the public.

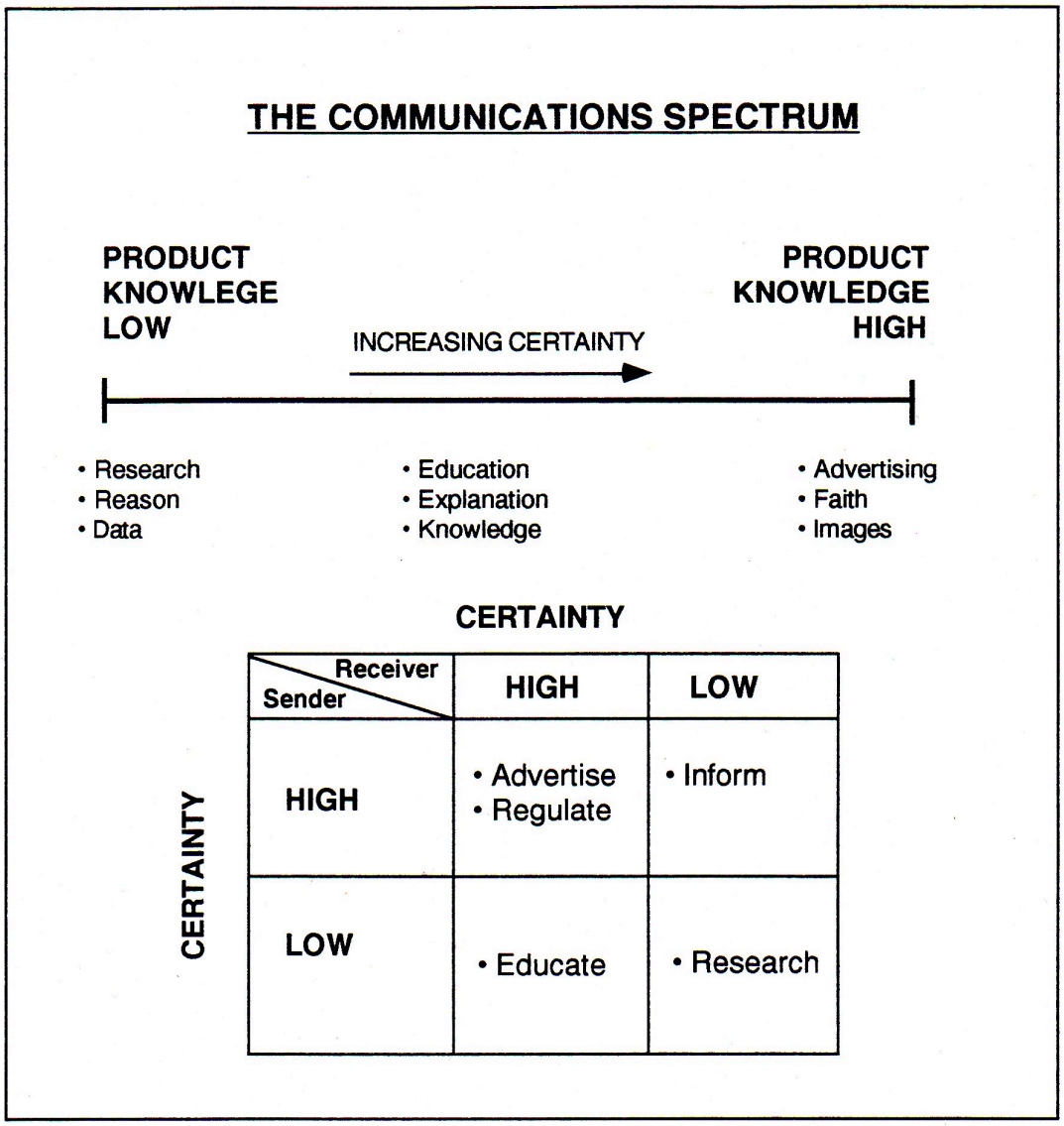

Fig 1: The communications Spectrum and matrix

Second, there is a spectrum of forms of communication, depending on the degree of *certainty* that the transmitter has regarding the content message, and the degree of *understanding* that the receiver regarding processing the message. This is illustrated in Fig 1. The implication of this Figure is that if the ie subject is not fully formed, ie, there is low transmitter knowledge, and the receiver is capable, then we can use "research" and "education" as a communication method. It is only when we are very certain about the nature of the subject that we can use "advertising", where we can project authority use faith and rely on images and simple instructions and slogans. In many cases in the subject of energy in buildings, we cannot act with authority, and use slogans because we simply do not have the subject adequately formulated. An implication of this is that we cannot embark on specific regulation, as we do not fully know what we are imposing on the public.

The market for information

The second associated piece of theory relates to the nature of markets. In this context, we mean the propensity of people to adopt or consume particular ideas, services or

products that we are selling. Again, an early chapter in the texts on marketing theory introduce the notion of the market spectrum, as displayed in Fig 2.

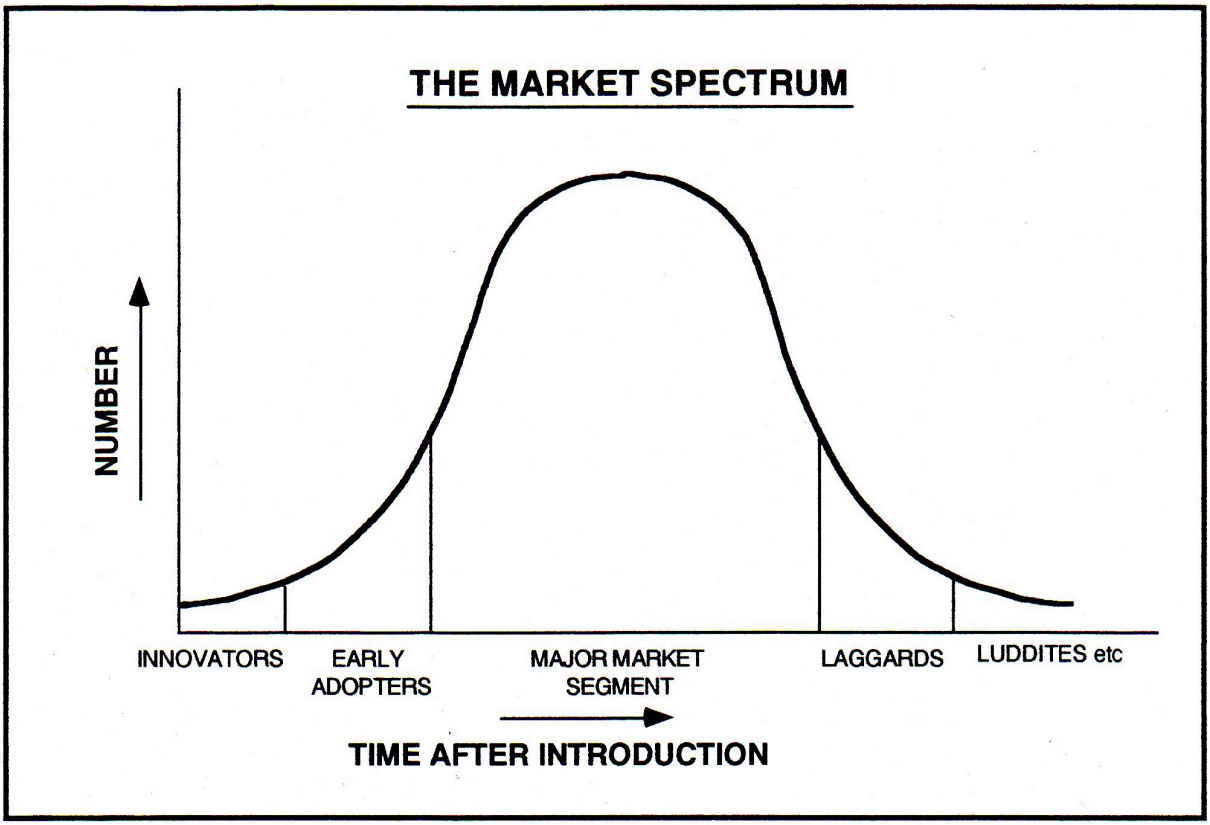

Fig. 2: The Market spectrum

The development of the market starts from the left side of the figure, when *innovators* are the first people to develop and try out new ideas. This group will tolerate all kinds of variation and uncertainty in the product, and many ideas never go beyond this stage.

These are followed by a group known as *early adopters*, who for a range of reasons, wish to be among the first to try a new idea. Some are motivated by unusual social or economic circumstances, others by reasons related to ego, fashion or the need to be different. Whatever the reason, they form a useful early trialling group, who are often discerning and communicative, and feed back valuable information, enabling the developers of the new goods or services to improve their offerings.

The next group, the *fast followers*, are often a larger group, again sharing a variety of motivations to acquire. They are prepared to pay a certain premium in time, effort or money for the benefit of early use. It is with this group that non-individual communications are first tried, generally with a view to gaining an understanding of the mass market. Niche markets are sometimes formed at this stage, catering to a small group with non-standard requirements. The product is still often quite fluid at this stage, with the emphasis in innovation shifting from its form to the way that it is produced and marketed.

The large group at the middle of the curve is generally known as the *major market segment*, to which a standardised and well-specified product is offered. Mass consumption is matched by mass production. Consumers in the early stages are driven by the rise of fashion; the later section by the value the mass production and certainty offers. This group is the homeland of mainstream economics, advertising and political philosophy.

The second last group, often known as *laggards*, trail the major market segment for their own range of reasons. Some are impoverished, others very discerning, others simply late to find out or late to enter the eligible market. Many members of this group are recipients of public assistance of some form, and are therefore the target for sociologists and welfare legislators.

The final group is generally given some uncomplimentary name, such as *reactionaries or luddites*. These people are at the opposite pole to innovators, and will refuse to adopt the idea at almost any cost. This group includes people in extreme isolation, extreme poverty, eccentrics and miscreants. They are either ignored, or are the object of fear, ridicule and/or police attention.

Those of us interested in the issues of energy and buildings have many lessons to learn from this potted theory of markets. These lessons include:

- There is a fairly wide and natural distribution in the propensity of people to accept and adopt new ideas, irrespective of the merits claimed by the innovator;

- The methods of communicating to the different segments vary, with a strong relationship between the communication spectrum and the market spectrum. That is, new ideas are promoted using intellectual methods, and well established ideas can be formulated into slogans that can be comprehended by large numbers of people.

- Legislation compelling adoption of ideas that are still in their formative stages may be counter-productive, and are likely to be rejected.

The product life cycle spectrum

The third concept related to this issue is the product life cycle. Not only is there a spectrum of forms of communication or transmission of ideas, and a spectrum of attitudes toward receiving ideas, but there is also a spectrum of development of the ideas that are being transmitted or received. These ideas may be in the form of tangible systems, such as goods or services, or intangible systems, such as collections of data, plans, theories and so on. Briefly, the stages of the life cycle of systems can be described as follows, with reference to Fig 3:

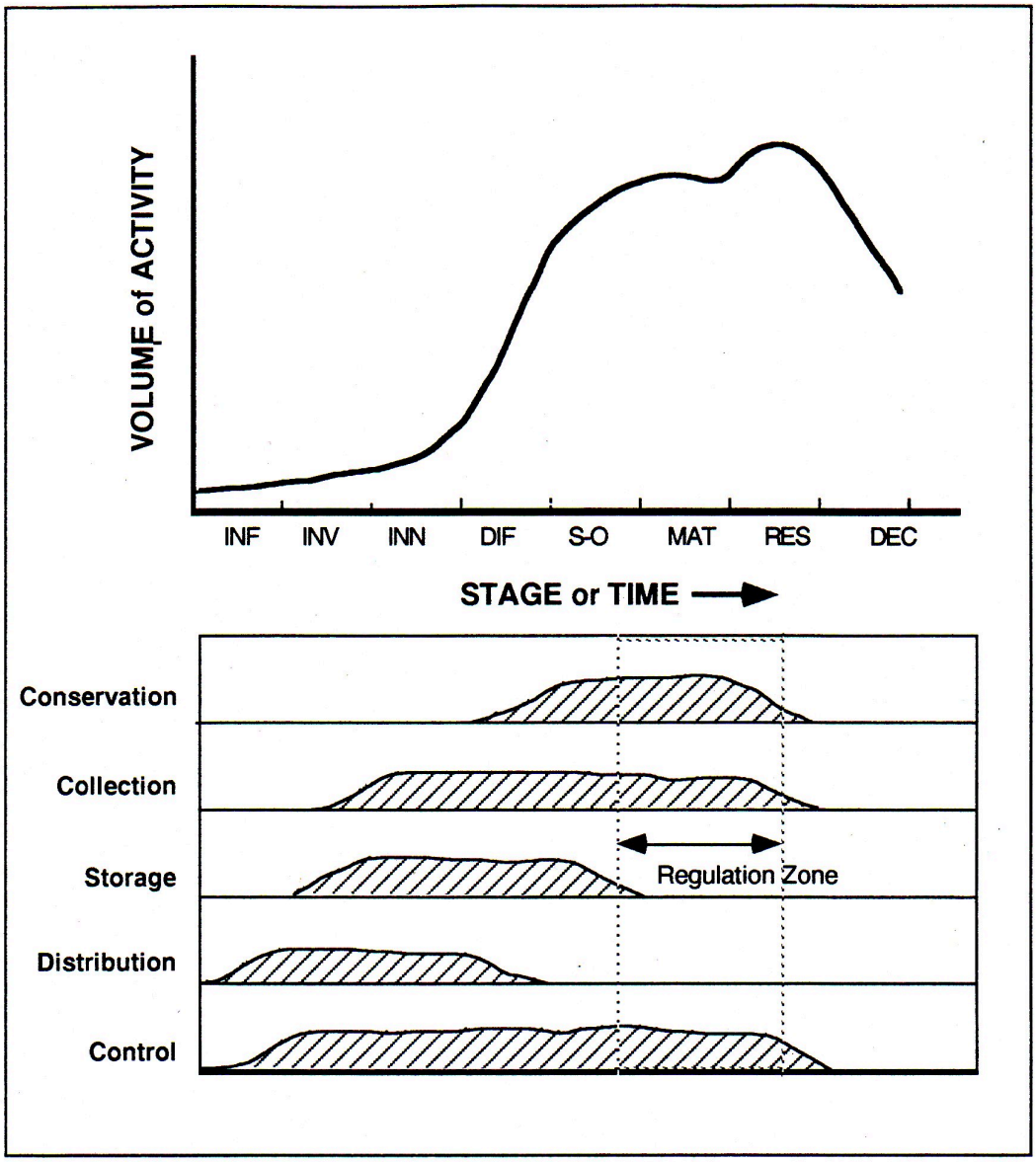

FIG. 3 a): The Product or System Life Cycle. b) The stage of development of various systems and subsystems in enrgy mangement in buildings.

(Abbreviations- **IN**Formation; **IN**Vention; **IN**Novation; **DIF**fusion; Shake-Out; **MAT**urity; **RES**urgence; **DEC**line

In its earliest stages, a system is essentially no more than a collection of data and ideas about the way things are, or could be organised. These facts and ideas coalesce into theories and plans, and are trialled in some form. This corresponds to the stages of *information, invention* and *innovation.*

With the development of a stable form of the system, it is promoted to a wider audience, in the *diffusion* stage, and ultimately reaches a point near saturation of the potential market, where early expansive plans for universal adoption are curtailed. This is the *shake-out* stage. A stable stage of acceptance follows, generally called the mature stage, where the system is considered to be part of normality.

With time, the system either slips into *decline*, or is *revitalised* to some extent by stripping away apparently superfluous aspects, leaving an efficient system performing a well defined task. Ultimately, even revitalised systems fall into decline, often due to systemic rigidity in the face of a new and rapidly changing environment.

In the context of energy in buildings, we can see that we are dealing with a spectrum of products and systems that are at various stages of development along the life cycle. Fig 3 b indicates qualitatively the life cycle position of some of these products. Common experience tells us that new products and systems need to be explained carefully to the prospective market, and later, mature products can be promoted with slogans and jingles, and we may even have enough confidence about the performance of the product to compel everyone to acquire it for there own good. Into the category of novel and uncertain we can place some energy collection, storage and distribution systems. Conservation systems such as insulation, as well as site orientation (ie development of the larger system, of which houses and building elements are sub-systems) are generally more mature. It is with trepidation that we should embark on regulation regarding the former group of systems; however, legislation to compel installation of insulation could be considered politically safe, as we know of its costs and benefits from both analysis and experience.

From the above analysis, we can see that communication, markets and system life cycles are three related dimensions to the development of issues. The appropriate course of action will depend on the point in the three-dimensional space that the issue occupies at that particular time.

5. The Solar Energy Information Centre- an appropriate response

Western Australia was a national leader in the institutionalisation of renewable energy development with the formation of the Solar Energy Research Institute of Western Australia (SERIWA) in 1978. SERIWA had some noted successes (including providing legitimacy to renewables by its very existence), and even more notable failures. In short, with the general decline in energy prices by the mid-1980s, together with a public pre-occupation with entrepreneurship and new technologies, SERIWA was closed in December 1986. Its public information role was taken up in part by the Murdoch University Energy Research Institute (MUERI), but there were large gaps in these services. By 1988 environmental concerns brought renewable energy back into fashion and the need for a new form of service was apparent.

The Solar Energy Information Centre (SEIC) was opened in November 1989 as a private sector response to this perceived need, and is the product of the vision of solar architect and author Garry Baverstock. The SEIC owns the ground floor of the solar-designed building that it occupies. It is established as a unit trust, with about 40 unit-holders, many of whom are either involved in the solar industry, or live in solar houses. Its main source of income is the sale of display space to companies in the solar, or related energy conservation and environment industries.

The aim of the SEIC is to provide access to information across the whole spectrum of development, from factsheet to completed project. The range of approaches can be divided into three groups , viz *awareness, information* and *action.*

To raise general *awareness,* the SEIC is located in an attractive building on a

prominent street corner position on a busy highway. Every day many thousands of people see the building with its prominent name. Further prominence is gained by the distribution of a monthly newsletter to about 1000 subscribers and selected media and opinion leaders. Opportunities to participate in the media are taken up wherever possible. This includes ABC and commercial radio talk-back and interview, some TV coverage, and numerous newspaper articles and columns. Creating and sustaining an environment of awareness is considered an essential first step to implementation.

Information is provided in a variety of ways. Enquirers are given personal attention by experienced staff wherever possible. Factsheets are supplied where appropriate, and commercial brochures if required. The SEIC has many products on display, which often become the focal point for verbal explanations. An atmosphere of enthusiasm is generated in the Centre, and enquirers are put in contact with known experts wherever possible. Part of the role of the SEIC is to provide a front-line of information so that the time of experts is preserved for more detailed enquirers. The monthly newsletter is also a source of technical information as well as providing a medium for news and views.

At the *action* level, enquirers are encouraged to indicate what course of action they are going to take after their visit or call. Being in the private sector, it is not constrained in its activities, and can become involved in entrepreneurial ventures if it so wishes. Although the first requirement of the SEIC is to ensure that all enquirers receive complete and objective information, it is quite often found that the enquirer wants a *solution,* rather than just *information*. The SEIC is able to undertake consultancies, or counsel the enquirer until an appropriate solution is found with a commercial vendor. Some products are for sale in the SEIC, such as books and high-efficiency light globes, small PV panels and toys. In most instances, enquirers are referred to exhibitors or other known commercial entities. In some cases the SEIC has acted as prime contractor, coordinating the work of other companies in the solar and related energy conservation industry. Clients have included major mining companies, hotels and home-owners.

An important aspect of this work in reference to the Building Regulation Review is that interest in solar energy in general often leads on to energy conservation matters in particular. We emphasise that customers do not see the world in terms of energy; they have particular problems that they wish to have resolved, and turn to the nearest, most accessible, and likely source of help.

In terms of the above analysis, the SEIC recognises that to a large extent is catering to the *early adopters*. As the Centre does not solicit work, or impose itself on the community, it must rely on enquirers taking the first step. In many situations, it believes that this is the only possible viable action, as the level of certainty of the information, and the stage of development of the products are such that promotion to the major market segment would be counter-productive.

There are exceptions to this. Roof insulation is so well proved in both product specification and performance, that regulation is possible to pick up the second half of the market spectrum. Similarly, correct site planning is essential, particularly on small blocks. It is a constant source of frustration to the architects and designers involved with the Solar Designers Group (a group formed by the SEIC) that they are presented with building sites that require all of their expertise to design a thermally comfortable

house. In other words, there is little prospect of the major market segment being addressed if the level of knowledge required to design correctly remains high through systemic problems in block orientation. Legislation for site planning is both possible and desirable. As to the individual elements within the buildings, many are still undergoing rapid technological change, relying on early adopters to feed back market information to improve the products, and progress the products towards maturity.

The SEIC believes that ongoing public sector involvement is essential, picking up the roles of communication and regulation when energy systems become reasonably mature, or when the level of uncertainty is very high, and research is required to better define the system. The middle ground, however, belongs to the "market place", where the risks and the rewards are shared by people who are well informed. Regulation at this stage needs to be of the form that allows diversity within the ethical standards of the community.

It is early days for the Solar Energy Information Centre. However, the future looks promising.

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