

SUGGESTIONS ON THE SELECTION OF STRATEGIC SYSTEM-LEVEL INDICATORS TO REVIEW THE DEVELOPMENT OF HIGHER EDUCATION

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This paper examines the possibilities for selecting a strategic set of indicators for monitoring the system-level development of higher education by UNESCO Member States and their higher education institutions. The paper draws on the international and national experiences of quantitative reporting of higher education. It discusses possible criteria for the selection of indicators and presents a preliminary framework of indicators for consideration.

This paper is a preliminary exploration of the possibilities for selecting a short list of strategic indicators that would allow UNESCO to monitor the international development of higher education at a system-level. The paper was written expressly for the Invitational Roundtable meeting held at Hiroshima University in June 2001, for which one of the expected outcomes was the formulation of an initial list of potential indicators. At the request of the meeting organisers of the meeting, the paper examines two questions:

- (1) What lessons can be drawn from international and national experiences in order to improve quantitative reporting of the development of higher/tertiary education?
- (2) What quantitative indicators could be chosen in order to review system-level development of higher/tertiary education in the context of the *World Declaration on Higher Education for the Twenty-first Century: Vision and Action* and the *Framework for Priority Action for Change and Development of Higher Education*?

The experience of indicators in higher education

There is a considerable theoretical and practical base on which to draw in attempting to answer these questions. For well over a decade work has been done to develop reliable and useful indicators for higher education. The OECD (Cuenin 1988; Kells 1993) has produced cross-national studies on the state of development of performance indicators, and detailed critical analyses have been conducted in the United Kingdom (Cave *et al.* 1997; Johnes & Taylor 1991) and other developed nations (McDaniel 1996). In Australia, there has been extensive quantitative data collection at institutional level based on the work of Linke (1991, 1995)¹. Much of the analytical

¹ Australia has established a system-wide indicator framework, based on the requirement for institutions annually to provide the government with statistical data. The 1998 report by the Department of Education, Training and Youth Affairs *The Characteristics and Performance of Higher Education Institutions* (DETYA 1998) lists a large set of indicators under the titles of broad context, staff, finances and outcomes. The development of indicators in Australia has occurred over a lengthy period and includes work carried out in 1991 by the Performance Indicators Research Group (1991), to

work has focused on the development of valid and reliable indicators for the purposes of institutional comparison within national systems, though some universities have engaged in cross-national benchmarking exercises (James 1999)².

The international interest in indicators has arisen because of pressures for both summative and formative evaluation. On the one hand, as higher education systems have expanded towards mass participation, governments have become concerned with university accountability and public transparency and have sought objective measures of the performance of institutions and national systems overall (see, for example, Henkel 1991). On the other hand, the interest in indicators has derived from the quality movement and its discourse of continuous improvement. In the latter case, some of the demand for objective measurement has been driven by the universities themselves in their pursuit of external reference points for charting corporate development within commercially competitive, market-oriented contexts.

Regardless of whether the purposes are accountability or continuous improvement, reliable measurement seems necessary for shaping judgements, policies and action. There remain well-known difficulties. These are not entirely insurmountable for the present project, however, as long as the limitations and bluntness of indicators are recognised and the project's sights are set accordingly. Not all that is valued in higher education is easily measured and reported, and qualitative indicators are necessary for the important aspects of higher education that defy quantification. Even the aspects that can be quantified pose measurement challenges. Due to the extent of system and institutional differentiation, the simplest of indicators are often accompanied by lengthy lists of qualifications and caveats. In addition, the possible quantitative indicators form a vast matrix: Davis (1996) has cited more than 300 possible indicators, while well over 200 indicators are reported annually in Australia (DETYA 1998).

The Invitational Roundtable is confronted with the formidable task of recommending a small set of indicators which strike a balance between what is technically robust, valid and reliable, and what is politically and practically possible and sensible. The recent national and international experience of indicators may help. Although it is a challenge to summarise what has been learned from 10-15 years of quantitative reporting of higher education, some key conclusions — or principles perhaps — do stand out. The following list of considerations might form a backdrop for the meeting's deliberations.

1. Indicators which are abstract or based on complex formulae are not easily interpreted — or are misinterpreted — by the various stakeholders with an interest

trial a broad range of quantitative indicators suitable for evaluating performance in higher education. This was followed by the release of two reports (DEET 1994, (DEET 1996) by the Department of Employment, Education and Training presenting various indicators for higher education institutions. *The Characteristics and Performance of Higher Education Institutions* is available on-line: <http://www.detya.gov.au/archive/highered/otherpub/characteristics.pdf>).

² *Universitas 21*, for example, is a company incorporated in the United Kingdom with a network of 18 universities in ten countries (<http://www.universitas.edu.au>). An initial objective in the formation of the *Universitas 21* network was to provide member universities with kindred partners for the purposes of international benchmarking.

in higher education. Simplicity is a virtue and indicators should be transparent and have good face-validity.

2. Notwithstanding the value of simplicity, indicators that are excessively crude, have tenuous links to goals, or fail to detect subtle differences and changes over time are of little value and are liable to be disregarded.
3. The most strategically useful results are achieved when an agreed framework for data collection and reporting is established. Particularly if comparative analysis is to be undertaken, indicator definition must be precise and quantitative variables must have adequate psychometric properties.
4. For most policy-related purposes, the number of indicators probably should be kept to a minimum, otherwise data collection tends to become an end in itself. The experience of benchmarking activities conducted in the business world is that large numbers of numeric indicators create data collection and management issues that distract from analysis and utilisation of findings (Karlof & Ostblum 1993).
5. While there are some 'simple' or 'absolute' indicators (Cave *et al.* 1997), rarely are indicators neutral or value-free. The creation of indicators establishes a hierarchy of values and the act of measurement and reporting affects the object of measurement. Selecting indicators attaches privileges to certain goals and functions and, over the long term, may redirect resources accordingly — whoever chooses indicators in effect decides the 'right' direction in which to steer activities. The normative tendency of indicators is valuable in many circumstances, but can act against institutional diversity within systems.
6. Categorisation of indicators is helpful in making projects manageable. Most indicators in higher education assume a process or production model representing the university/higher education as a system of inputs, processes and outputs (Cave *et al.* 1997: 25-37). The output indicators (e.g. completions and completion rates, levels of satisfaction with courses and teaching, graduate employment rates and destinations) are generally the most difficult to measure and require considerable subjective interpretation.
7. Raw quantitative data usually requires modification before they convey enough meaning to guide policy or action. This may involve representation as a dividend (e.g. public expenditure on education as per cent of GDP) or the calculation of a trend over time (e.g. annual per cent change in public expenditure as per cent of GDP).
8. A characteristic of higher education is the lengthy time lag between actions and outcomes in many important areas. This creates particular difficulties for quantitative measurement if the purposes are continuous improvement. Analysis of indicators and any action planned as a result should take account of the time horizon for outcomes.
9. The direction of measurement of some indicators is questionable, depending on whether they are assumed to be measures of quality or efficiency. Further, the interpretation of certain outcome indicators may benefit from analysis of output quality. If *expenditure per student* is taken as an example, by one interpretation high unit cost may be taken as an indicator of a high quality educational process. Low unit cost, on the other hand, might be construed as a measure of efficiency. In either case, any conclusions drawn will be of dubious value unless data on the quality of educational outcomes is available.

10. Measures of the quality of teaching and research and the value-added effects of higher education are particularly elusive and subject to reputational effects. The present performance indicators for teaching quality have alternative conceptual bases and most have a highly subjective element to them (Cave *et al.* 1997: 225)³. McDaniel (1996) found from a large European opinion survey of interest and expert groups, that of 17 commonly cited process indicators, only seven were deemed relevant indicators of quality in higher education: employers' evaluation of graduates; academic reputation of staff; peer review of curriculum content; employment rate of graduates; completion rates; student evaluation of quality; and peer review of teaching process. Note that five of these are subjective measures.
11. The question that besets most indicator projects is, having collected data, what to do next? Indicators do not in themselves spell out action. Action requires interpretation of the meaning of indicators within a broader understanding of the context. Inevitably there is a comparative dimension to indicator projects, even if it is not explicit. Comparisons are valuable — perhaps indispensable — in informing and guiding policy and action. Comparisons may be against self over time, against targets, or against like systems or organisations. Since most indicators are heavily dependent on social, political and economic contexts, comparisons between institutions or between systems must be done cautiously with knowledge of and respect for contextual differences.
12. Once indicator information is available there is a tendency for it to be used for purposes for which it was not designed. Within the more market-oriented systems, indicators at institutional level provide commercially sensitive information that is of obvious interest to prospective students. System-level indicators may of course attract little attention of this kind. The potential misuse of data can be reduced if protocols are established for data handling.
13. Finally, the collection of good data is costly and adequate resources need to be available and set aside for collection, analysis and reporting. Generally speaking, institutional cooperation in providing data for system-level indicators is vital, since it is feasible to collect certain information only at institutional level.

Considerations in the selection of a strategic set of system-level indicators

The bold objective of the *Strategic Indicators for Higher Education* project is to use indicators to influence higher education development and change in agreed directions. All going well, the project will contribute to a far-reaching chain of events. That is, the indicators the project recommends will directly and indirectly:

- reiterate the core elements in the vision articulated in the *World Declaration* and the *Priority Action Plan*;
- support improved quantitative reporting of higher education;

³ The Australian Higher Education system uses the Course Experience Questionnaire (CEQ) (Ramsden 1991) in an annual survey of graduates to measure the quality of teaching on a field of study basis. The instrument has scales measuring good teaching, feedback to students, student workload, generic skill development and overall satisfaction. The measurement of teaching quality has been controversial and some criticism. A federally-funded project has recently recommended new scales be incorporated in the CEQ to measure additional dimensions of the student experience (McInnis, Griffin, James & Coates 2001).

- focus attention on the interpretation of indicator data and improve understanding of the conclusions that can be drawn from data; and
- encourage and support *informed* policy and action towards the vision.

Deciding on an indicator framework is complex enough in any setting, but the selection of indicators appropriate at system-level involves particularly complex political, technical and practical issues.

Looking over the previous list of principles, some immediate conclusions can be made. The *Priority Action Plan* suggests system-level action for change and development across the three areas of inputs, processes and outcomes, and suitable indicators might be chosen accordingly. Though there are many stakeholders in higher education, it is essential to treat policy-makers and administrators as the principal audience, for these people have the authority and the means to encourage and support effective data collection, analysis and policy-making at both system and institutional levels. Finally, the normative set of values for the indicators to be chosen are articulated by the vision for development proposed in the *World Declaration* and the *Priority Action Plan*. For the purposes of the project these values are non-negotiable, even though some of the assumptions underlying them could be questioned.

Ideally, the indicators would share the virtues below. It is highly unlikely, however, that individual indicators will meet each of these requirements and the Invitational Roundtable will need to consider where compromises are necessary.

1. The indicators should be sufficiently provocative and relevant to encourage the commitment of resources to monitoring and action. They should therefore correspond with widely shared national and institutional values and priorities.
2. They should be capable of definition that is meaningful across national and system differences without excessive caveats, and must be applicable in developed nations, developing nations and less developed nations.
3. They should measure system-level qualities rather than institutional-level qualities, however they should be sufficiently relevant at institutional level.
4. They should be easy to interpret for all constituencies.
5. They should be sufficiently detailed to be capable of detecting small developments over time. They also must be stable over time to allow continuity of measurement.

Issues that arise

In considering the possibilities for developing a preliminary set of recommendations for presentation to the Roundtable, three issues emerged. These are outlined below, together with the author's personal views on each. Further discussion of these matters will be valuable.

(i) Are existing datasets capable of adequately representing the vision?

All else being equal, it would be best if the recommended indicator set could be derived directly from readily available sources, or be at least extractable from existing datasets. However, Abercromby and Fielden's (2000) survey of indicators in the context of the *World Declaration* and the *Priority Action Plan* reveals the absence of data in many important areas and tenuous links between goals and existing data in others. If the project's recommendations were to be limited to available data then the project might fail in its main purpose — that is, to be strategic. It seems unavoidable that the project recommend indicators that would suggest some, or all, Member Nations collect new data. This would be a *highly strategic* step for the project to take, one which corresponds with an objective of assisting Member Nations and institutions to improve the reporting of higher education through the development of data definitions and collection processes. While cost must clearly be considered, two or three yearly data collection cycles, or spot surveys, may be appropriate and would allow adequate time for developments to be measured. This may be an appropriate area in which developed nations assist less developed nations in data collection.

(ii) What of the aspects of the vision that are not quantifiable?

The task would be more straightforward if all the goals expressed in the vision were quantifiable. However, core elements of the vision are not quantifiable in any sensible way. Consider for example the commitments to academic freedom and institutional autonomy. The conditions required for these freedoms are exceedingly difficult to quantify. Yet omitting such values and goals from the framework on the grounds that they can only be assessed qualitatively would seriously damage the relevance of the project and weaken its relationship to the vision. It therefore might be necessary to consider at least a small number of qualitative indicators requiring subjective measurement and reporting. Depending on the circumstances, it might be feasible to use three- or five-point scales (e.g. low/moderate/high or item specific nomenclature). Note that the OECD (1998) reports the locus of educational decision-making by mode of decision-making using subjective survey data.

(iii) How can the project support the appropriate and effective interpretation of indicators?

In addition to the specification of indicators, the project might find it beneficial to consider developing a support framework that includes recommendations for indicator interpretation within systems and institutions. Usually, it is helpful to suggest how an indicator might be interpreted and used; equally, it can be helpful to indicate how an indicator should not be used. In this regard the implicit comparative dimension of the project requires further consideration. Arguably an indicator is only useful if it allows development to be charted over time or benchmarking against comparable systems/organisations. At the least, the project assumes comparison against self over time: it is anticipated that Member Nations will monitor their development by looking for trends in their own indicator data. A potentially valuable additional outcome would be a framework for appropriate comparison with *like* partners. With appropriate supporting qualitative investigation and analysis, comparison of this kind might identify particularly effective policies and actions. Any comparative work must

of course acknowledge contextual differences and expertise in comparative analysis would only be developed over a considerable period of time.

Some preliminary suggestions

At the request of the meeting organisers, the author has made a preliminary attempt to select a small set of system-level indicators. The approach taken is described below.

The *Priority Action Plan* establishes well over sixty goals. As a first step in proposing a small and strategic set of indicators it was necessary to distil the central values and priorities that relate to system-level action⁴. This involved some reduction and condensation of the numerous priorities outlined in the plan, and some unavoidable loss of subtlety. In doing so, however, it became clear that the goals implied in the *Priority Action Plan* are rarely discrete: they are often closely interrelated or overlapping. Furthermore, each goal may require multiple actions and some actions will affect a number of goals: the goal-action relationship is many-to-many. (Implying that the value of the indicators will derive from the *set overall* rather than individual indicators in isolation.)

This initial ‘pruning’ exercise isolated four priority areas for system-level development in higher education, each with sub-categories, which reflect the areas in the *Priority Action Plan* for which indicators would be desirable. Fig. 1 presents the four areas as a condensed framework for the *Priority Action Plan*.

- 1. Indicators of an enabling policy and policy-making framework**
 - 1.1 Accountable policy and decision-making framework, national and institutional
 - 1.2 Clear policies for higher education teachers
 - 1.3 Promotion and development of research
 - 1.4 Conditions for freedom and autonomy (institutional, academic, student)

- 2. Indicators of the commitment of resources**
 - 2.1 Fulfilled commitment of resources to higher education
 - 2.2 Increased cooperation between countries with regard to higher education and research, especially to reduce widening gap between industrially developed and developing nations
 - 2.3 Use of new technologies

- 3. Indicators of appropriate levels of participation, access and retention**
 - 3.1 Expansion of access
 - 3.2 Equity of access
 - 3.3 Provision of student support

⁴ There is of course considerable overlap between system-level and institutional-level indicators. However, institutional-level indicators are largely a subset of system-level indicators. Consequently, not all system-level indicators are appropriate as institutional level, though most, if not all, institutional-level indicators might be relevant at system level, or have close counterparts at system level.

4. Indicators of economic and social outcomes

- 4.1 Links between higher education, industry and graduate employment
- 4.2 Promotion of international mobility
- 4.3 Catalytic effects, on education systems overall and on local, regional and national development

Fig 1. Condensed framework for the *Priority Action Plan*

The four tables on the following pages present the sub-categories of each of these areas and list the elements of the *Priority Action Plan* to which each sub-category relates.

The tables also include (very) tentative suggestions for indicators. Wherever there are obvious gaps these are highlighted. The gaps occur for priorities that are strongly process oriented and where the existence of processes and outcomes are difficult to quantify. No attempt has been made at this stage to offer precise data definitions.

Some of the possible indicators are simple proxies for the action/goal in question. Admittedly some are at a considerable conceptual distance from the outcome they might represent, raising concerns about face validity.

Some consideration must be given to whether the indicators should attempt to measure outcomes or the existence of actions to produce outcomes. An emphasis on direct measurement of outcomes is not always possible but perhaps highly preferable. There are two reasons for this. First, outcomes are more likely to be quantifiable. Second, the relationship between actions and outcomes can be obscure and cause-effect relationships may differ across social and cultural contexts. In the end, what is most important perhaps is evidence of development in the preferred direction, where necessary, rather than how the development is achieved.

Electronic technology will continue to have far-reaching effects in higher education. There are obviously sharp differences between usage and purposes in developed and developing nations, however the use of educational technology is an indicator of modernisation and (possibly) effectiveness in access and quality of learning. The suggested 'per cent of course time using technology' is clumsy, but would better reflect the penetration of information technology into the curriculum than a simple volume of hardware indicator.

The internationalisation of higher education proceeds apace and this trend coupled with the electronic delivery of courses will significantly affect many indicators in the future. Notable in the context of the likely impact on the utility of system-level indicators are international course franchising and cross-national enrolments in on-line delivery. The USA is already a major provider of full on-line courses, various international consortia are rapidly forming. Indications are these developments will grow for at least the next decade. The new patterns of international enrolment are not yet well understood, yet they will seriously confuse interpretation of certain system-level indicators in the future.

Table 1

1. INDICATORS OF AN ENABLING POLICY AND POLICY-MAKING FRAMEWORK	
ACTIONS/GOALS	POSSIBLE INDICATORS FROM WHICH TO CHOOSE
<p><u>1.1 Accountable policy and decision-making framework, national and institutional</u></p> <p><i>1(h)...involvement of all relevant stakeholders...</i> <i>1(i)...enhance women's involvement in decision-making...</i> <i>1(k)...students involved in [institutional] policy decisions...</i> <i>6(g)...high quality ... internal and external [institutional] evaluation</i></p>	<p>?</p> <p>These actions/goals are highly subjective and not easily specified quantitatively</p>
<p><u>1.2 Clear policies for higher education teachers</u></p> <p><i>1(j)...clear policies concerning higher education teachers...</i> <i>6 (d)...participation [of all academic staff] in teaching, research...</i></p>	<p>Academic salaries (adjusted using OECD Purchasing Power Parity data)</p> <p>Per cent of staff time spent on R&D</p> <p>Per cent of staff time spent on teaching</p> <p>Per cent of academic staff holding doctorates (Opportunities for professional development, performance review?)</p>
<p><u>1.3 Promotion and development of research</u></p> <p><i>1(b)...reinforce links between higher education and research</i> <i>1(e)...close links between higher education and research institutions...</i> <i>6(i)...promote and develop research [in] all higher education disciplines...</i></p>	<p>Expenditure on R&D in higher education <i>overall and by discipline</i> as per cent of overall national expenditure on R&D</p> <p>Research higher degree students as per cent of all students</p> <p>Per cent of staff time spent on R&D</p> <p>Expenditure (adjusted using OECD PPP data) on R&D per academic staff member</p> <p>Proportion of academic staff involved in research</p> <p>Proportion of higher education R& D financed by private enterprise</p>
<p><u>1.4 Freedom and autonomy (institutional, academic, student)</u></p> <p><i>1(l)...students have right to independently organise...</i> <i>1(n)...conditions necessary for the exercise of academic freedom and institutional autonomy...</i></p>	<p>?</p> <p>Again, actions/goals that are highly subjective and not easily specified quantitatively</p>

Table 2

2. INDICATORS OF THE COMMITMENT OF RESOURCES	
ACTIONS/GOALS	POSSIBLE INDICATORS FROM WHICH TO CHOOSE
<p><u>2.1 Resource commitment to higher education</u> <i>1(g)...commitment of human, material and financial resources...</i></p>	<p>Higher education funding <i>overall and by source, public or private</i>, as per cent of GDP</p> <p>Resources (total public and private) per full-time student equivalent (adjusted using OECD PPP data)</p> <p>Expenditure on teaching as per cent of overall expenditure</p>
<p><u>2.2</u> Increased cooperation between countries with regard to higher education and research, especially to reduce widening gap between industrially developed and developing nations</p> <p><i>4 ...increasing cooperation between all countries at all levels of economic development ...</i></p> <p><i>4...reduce widening gaps between industrially developed and developing countries...</i></p>	<p>??</p>
<p><u>2.3 Use of new technologies</u></p> <p><i>8 ...use of new technologies be generalised to the greatest extent possible to help higher education institutions...</i></p>	<p>Per cent of higher education course time using information/communications technologies</p>

Table 3

3. INDICATORS OF APPROPRIATE LEVELS OF PARTICIPATION, ACCESS AND RETENTION	
ACTIONS/GOALS	POSSIBLE INDICATORS FROM WHICH TO CHOOSE
<p><u>3.1 Expansion of access</u></p> <p>2 ...[where necessary] diversifying and expanding access...</p> <p>1(d) ...choice and flexibility of entry and exit points...</p> <p>1(d) ...lifelong learning...</p>	<p>Students (domestic) <i>overall and by discipline</i>, per 100,000 population</p> <p>Per cent of students 25 years and over (commencing domestic students)</p> <p>Basis of admission</p>
<p><u>3.2 Equity of access</u></p> <p>1(a) ...accessible to all on basis of merit...</p> <p>1(i)...consolidate women's participation...</p> <p>3...creating gateways...especially for older students...</p>	<p>Ratio of higher education participation share of lower socio-economic background students to population share of lower socio-economic background people</p> <p>Per cent of first-generation higher education students, commencing students</p> <p>Ratio of males to females, commencing domestic students</p> <p>Women enrolled in research higher degrees as per cent of all students enrolled in research higher degrees</p> <p>Per cent of students enrolled part-time</p>
<p><u>3.3 Provision of student support</u></p> <p>6(k) ...forms of student support, including measures to improve student living conditions...</p>	<p>First-year retention rates</p> <p>Student (all)/teaching staff ratio</p> <p>Student (all)/all staff ratio</p>

Table 4

4. INDICATORS OF ECONOMIC AND SOCIAL OUTCOMES	
ACTIONS/GOALS	POSSIBLE INDICATORS FROM WHICH TO CHOOSE
<p><u>4.1 Links between higher education, industry and graduate employment</u></p> <p><i>7 ... closer links between higher education and world or work ...</i></p>	<p>Graduate employment rates two-years-out, <i>overall and by discipline</i></p>
<p><u>4.2 Promotion of international mobility</u></p> <p><i>1(m)...facilitate international and national mobility of staff and students...</i></p>	<p>International students as per cent of all students</p> <p>Per cent of academic staff with highest qualification awarded overseas</p>
<p><u>4.3 Catalytic effects, on education systems overall and on local, region and national development</u></p> <p><i>1(c)...catalyst for entire education system...</i></p> <p><i>1(f)...contribute to local, regional and national development...</i></p>	<p>Total expenditure on education <i>overall and by level</i> as per cent of GDP</p> <p>Participation rates in education by level</p>

APPENDIX 1 Notes on the possible quantitative indicators listed

1. Participation rates of socio-economic subgroups are notoriously difficult to measure. The usual socio-economic data are income, employment type and education level. For higher education access purposes, parental educational level is a useful measure of 'first generation' access.
2. Data on *commencing* students is more sensitive in detecting the effects of changes and developments than data on *all* students.
3. Women's participation is best gauged by discipline and level (e.g. participation in research higher degrees).
4. Research consistently shows the first year of study in the critical time for retention. First year retention rates serve as a proxy for the range and quality of student support services.
5. To measure the promotion and development of research, expenditure on R&D in higher education is best presented *by discipline* as well as aggregate overall.
6. *Research higher degree students as per cent of all students* is a good indicator of the level of R&D, though disciplinary variations need to be considered.
7. To gain an accurate picture of graduate outcomes (employment rates and destinations), measurement needs to take place at least one year, possibly two years after graduation. Reporting outcomes by broad discipline is valuable.
8. Along with age, *basis of admission* is a good indicator of access/lifelong learning.
9. Crude currency data (e.g. academic salaries) should be adjusted using OECD Purchasing Power Parity data.

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