

Information Need and Dissemination: Indian Rural Context

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ABSTRACT

The first problem is: we don't exactly know the information needs and information seeking behavior of the rural populace; second: we still haven't found an appropriate mechanism, system to deliver this information. aAqua (almost all questions answered) a multilingual multimedia question answer system is a project at Media Lab Asia, IIT Bombay, which is a step forward in attempting to solve this problem. aAqua a multilingual communication system connects the farmer's question with the expert's answers. This paper discusses its: goals, deployment, usability evaluation, issues/findings, redesign, and future concepts. We'll discuss the interaction design concepts that involve multiple modes of both: disseminating and collecting specific queries of the farmers. This paper will show conceptual models that can work together in formulating an effective: *Rural Information system*. [2]

Keywords

Question & Answer, multilingual communication system, information needs/ dissemination, multimodal interaction framework, clearing house, information architecture

1.0 Introduction

In introduction we'll talk about: what is aAqua, the primary goals with which it was initiated, and initial problems identified through usability inspection that laid the focus for further work.

1.1 About aAqua

aAqua stands for: almost all questions answered. It's a smart question answer system: effectively an **online**, yet **archived**, discussion forum accessible using a web browser, allowing users to create, view and manage content in their mother tongue. It aims to incorporate innovations from the perspective of cross-lingual multimedia information storage and retrieval and intelligent databases. [1]

aAqua the multilingual multimedia question answer system is in function since Dec. 2003. Since then it has received

around 150 questions which experts have answered. Each question can trigger a discussion. So far around 260, which

has been evident from the response. The questions can be posted within predefined categories forming a set of forums

relevant to the local context. The most active forums in aAqua are crop disease and animal disease. aAqua is active in 10 kiosks in Pabal and Rajguru, Shirur, and Haveli taluka region in Maharashtra.

1.2 Initial system interaction

aAqua's existing system interaction prior to user study was as follows: Farmer (end-user) asks question on aAqua from a kiosk; along with the question the farmer can attach any relevant images; experts in Baramati receives the question and answer back, providing solutions to the problem.

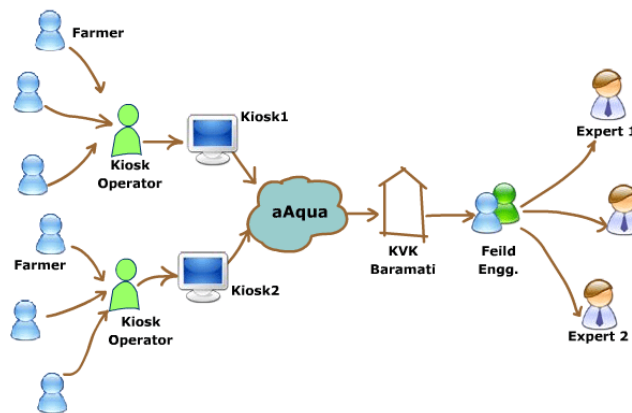


Fig. 1.0: Initial System flow for aAqua

(refer to fig 1.6: for the redesigned system model [pg.4])

1.3 Interface interaction for initial aAqua

The information architecture of aAqua was typically based on a forum structure [4]. The hierarchical interaction sequence was as follows: Within top categories such as Agriculture, Information, etc. were forums, like: Crop diseases, Animal diseases, market information etc. Questions could be posted in each forums, and each question triggered a series of discussions in form of threads. To make a new post user had to go within a forum through a category. Any subsequent reply to a post could be made from within a post itself. In both cases the user either clicked a link: "Post New Thread" or "Reply to this post" which led to the same page to send the post. Features

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like attaching images, hyper-linking text within a post, adding to favorites, etc. were available to the user. Administrators could edit the existing posts, and create new forums. The content created (question and answer) is archived for further information retrieval through meaning based search.

1.4 Usability inspection and user study

We started with a usability inspection of the existing aAqua Question and Answer forum followed by a user study, conducted in Pabal. The hypothesis generated from the usability inspection helped us to fix our focus for the user study. The results of a HTA(hierarchical task analysis) is shown in the figure below.

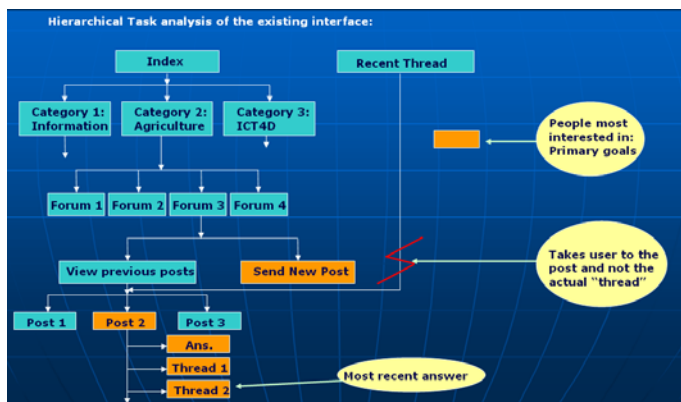


Fig. 1.1 shows break-points in the task flow

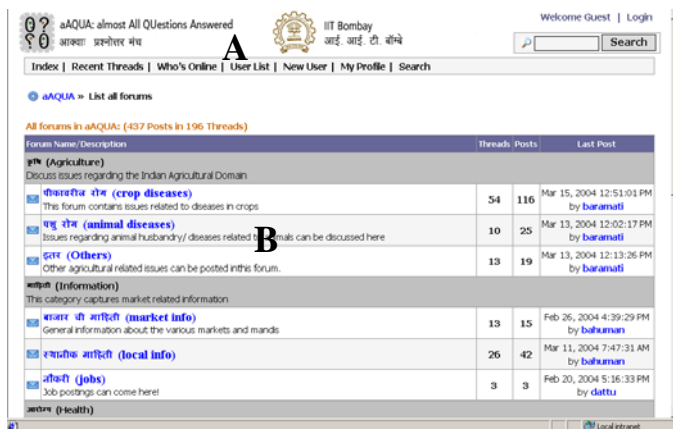


Fig. 1.2: shows the home page for initial aAqua (A- refers to global links for: Index, Recent Threads, Who's Online, User List, New Users, My Profile, Search, B – refers to: forums under: Agriculture, Information)

Referring to fig. 1.2 we can see that the Questions that the people will be most interested in will always be hidden three levels down: index > Forum > Postings > Question / Answer. There was also no way to check if the question has been answered or updated with a new post apart from going three levels down and checking each posts. The other problems are described in the section 2.0 below.

2.0 Conceptual model problems at system level

We did a usability study and found that there is a gulf between its intended use pattern and actual usage

happening. The kiosk operators are the ones who login and ask questions on behalf of the farmers: therefore a kiosk operators interest and motivation to do so, directly impact both its usage and quality of service provided. The time lag (delay) between the question and answer may also effect user satisfaction. Usability results and findings are discussed in detail in section [2.1]. We also realized that a round the clock moderation (manned/unmanned) would improve the **quality of service**, important to generate returning users. This paper will discuss: (a) the loop-holes and interaction problems in designing technology for rural regions. (b) Gulf between users actual needs and system behavior/architecture.[2] A unique study and work done by ICT's e-chopal group states that any form of transforming existing system should be essentially based on: Re-engineering and not re-construction and the whole system should be addressed and not just parts [2] (c) How models that work with urban setup may not work in rural context (d) Technology reach and its access, need not necessarily mean problem solving: its *effective* interaction design may (e) how to add value to question & answer system (for specific queries) by **pushing context relevant information** through a repository of information (f) integrating multilingual meaning based search with users open-ended questions [7] (g) developing a clearing – house for Agriculture information retrieval (h) how a multimodal information push, pull and dissemination system can help in defining an effective and useful Rural Information System [2] (i) and finally different Conceptual Models of different users/players within the proposed system: End users (farmers), moderators, and Experts

2.1 User study and findings

User study was conducted in Pabal (Maharashtra) and valuable data also gathered from Baramati: place from where the questions are being answered by experts. A typical usage pattern scenario can be explained as below: In a scenario Ramnath Ghadge comes to kiosk and tell the kiosk operator about the symptom of his crops. The kiosk operator collects the information and also he takes a picture of his crops and prepares the multimedia content and posts it through aAqua. Next day Prof. Kadir sees the query on his aAqua interface at baramati KVK (Krishi Vigyan Kendra) and suggest some medicine for his crops. Ramnath Ghadge receives the information and gets benefit. Also he shares his symptoms information on aAqua and the information becomes useful to Ramlal.

The usability problems with the above context scenario is: the expert usually does not directly check the questions addressed to him on aAqua nor does the farmer directly post his question. With reference to the **figure 1.0**: there is kiosk operator who posts farmer's question and field engineer who manually take the question's print-out to the farmer who then answer's the question. The field engineer in Baramati then replies the question with the expert's answer. Now many a times it is dependent on the kiosk operator's motivation and enthusiasm to check the answer (question's update)and inform the farmer that his answer has come. The time lag between the effective question and

answer is thus greatly dependant on the two person– the kiosk operators and field engineers/experts. Imagine if the farmer gets his answer after two days of visits to the kiosk (after asking the question) and finds out that the information sent by him was not complete / concise enough for the expert to diagnose his problem. The expert could have reverted back asking for specific soil conditions and image of the diseased crop to be sent – but the farmer on the other end lost two days just to rectify his question again. He may have to wait yet another couple of days to get his answer. In case of critical problems which need immediate attention such delays between the question and answer may render useless for the end user. After the user study first level iteration was targeted for aAqua. The first version iteration focused more on interface interaction problems. It aimed at pushing – up context information (questions in our case) to the users. A better interaction model was also designed to help users keep a track of the questions sent by them, their replies, status and updates. Not so frequently used task were chunked together in separate categories. The first version iteration release is described below.

Redesign of aAqua: First Level

3.0 First Level Iteration of the aAqua Interface:

Field study was conducted and problems found could be categorized into: (a) visual clutter and information chunking problem (b) use of inconsistent vocabulary (post vs. question and answer) (c) Interface & interaction design problems such as: 1. No difference between question and answer 2. Time delay between question & answer effected user satisfaction 3. Link for: asking question hidden within a sublevel etc. A quick usability and recommendation was conducted and redesign was carried forward. The first version of revision was called. J1 (Fig. 1.4, 1.5). Figure below (Fig. 1.3) shows the task flow with faceted hierarchy [8] which improved the information architecture for the first version iteration.

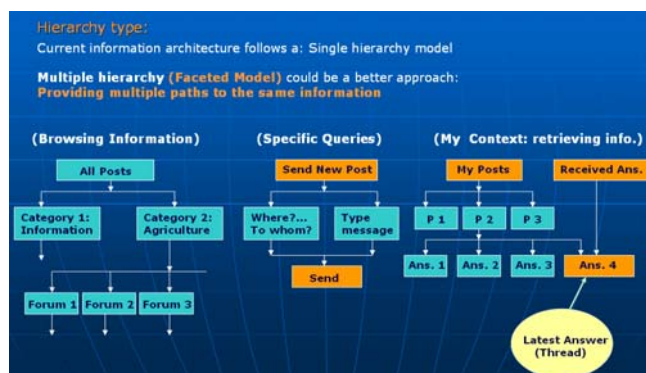


Fig. 1.3: Proposed task-flow for first level iteration

Fig. 1.4 shows the Logged in Home page of aAqua (J1) which was the redesign done based on the user study and interaction design analysis. Referring to Fig. 1.4 screen space marked by A has: A view to 7 most relevant Forums on aAqua; B shows: the users ability to be able to post a

question from the home page itself (remember earlier posting a question was hidden three navigational levels down); C shows: the most recent Questions on aAqua, and D shows: the Questions asked by the logged in user's. When the user has not logged in he has access to A, B, C, from the home page, and can enter his user name and password from area D.



Fig. 1.4: Home page of First Level Redesign for aAqua (called J1)

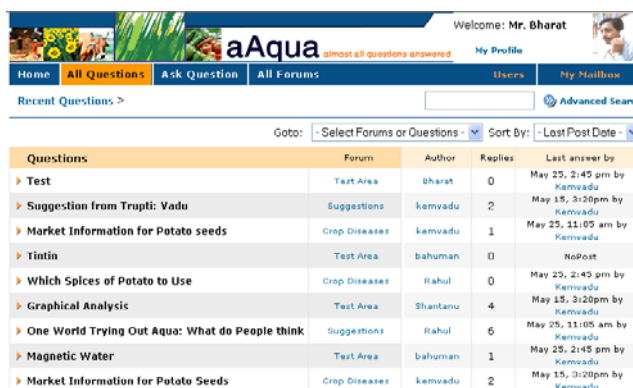


Fig. 1.5: Internal screen Showing: All Questions (aAqua redesign- first level)

Fig. 1.5 shows the page for the view to: All Questions displayed in chronological order in terms of date of update with an answer or new post within the existing thread. The first five question are the most viewed for a check into recent updates, thus, a view to the first five questions is available on the home page itself for speed and ease of use.

Insights for further Interaction Iterations

4.0 User interaction and Context Scenario still not satisfied

J1's usability study revealed the following problems: a) The moderators/field engineers/kiosk operators were the actual users of aAqua: they were the ones who posted questions on aAqua on behalf of farmers b) Need for improving the "quality of service" was felt: giving instant

feedback to farmer's questions, classification of questions asked into meaningful categories c) enabling experts to post articles in aAqua d) need to have different interfaces for: farmers, moderators and Experts.

5.0 Kiosk operator's motivation / dependency vs. user conceptual model

The kiosk operators are the interface between aAqua and the end users (farmers) in the present model. In the present scenario the feedback to the user with the experts answer is dependent on the kiosk operator's active participation. After the experts answer the question the kiosk operator has to take the call and inform the farmer that his answer has come, if the farmer himself fails/forgets to come and check his answer. It may happen that the farmer comes the next day to check his answer but finds that the expert has not responded. He then might not come a couple of days to check the update. There are two approaches that could be taken to solve this problem: **1)** Agriculture graduates could be trained/ encouraged to take up information kiosk business along with other business. KVK Baramati has sent a proposal to the government to round-off the kiosks that are not functional and hand it over to new operators (who could be agricultural graduates).[3] Being directly associated to the agricultural field they can add value to the expert question answer system. **2)** Second approach could be to liberate the kiosk operators from the burden of being a participant in the working of the system. The farmer pays the kiosk operator for the internet charges incurred while asking a question or checking the answer. This is possible if tomorrow the farmers themselves become users of aAqua and the kiosk becomes only "one of the point of access of the question answer system". The farmer could ask a question over a telephone / cell phone, browse his question / answer on his cell phone and then *only* goes to the kiosk to either give a detailed description of his problem (with attached images etc.) or take a look at the detailed prescription (can also take its print-out) as answer sent by the expert. These points are discussed in detail in: (6.0) and (10.0).

Scaling Up for aAqua (J2): work in progress

6.0 Adding value to the question answer system: introducing moderators (aAqua back-end)

Usability and user study gave an insight into the need for *Improving the Quality of Services* of aAqua. It was felt that a continuous moderation of the system is required: may it be manned, semi-automated or automated. When a farmer posts an open-ended question he may not himself give it a relevant heading. The questions archived in aAqua database needed moderation for: a) classifying questions under relevant categories / multiple categories b) Editing the question metadata for meaning full search and browsing through Question headers (titles) c) forwarding the questions and keeping a track for answer from the experts d) Immediately answering questions themselves with "similarly asked questions" links (if the context of the

question exactly matches a question asked earlier. The figure Fig. 1.6 below explains systems conceptual model:

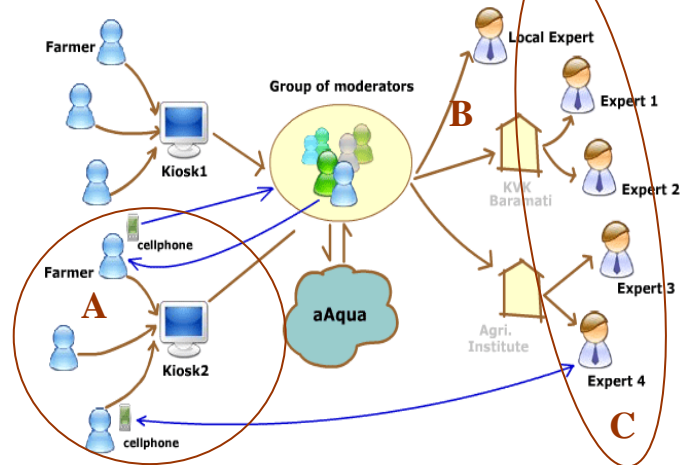


Fig. 1.6: Systems Concept Model (Redesigned)

The conceptual model described in Fig. 1.6 has the following interaction- **A:** User asks a question on aAqua through a kiosk – **Point A**. He can be directly contacted by the moderator or an expert in case of any issues or clarification required. This may start an interaction through the mobile or a land-line phone. **B:** A moderator / group of moderators are on line. They could be two – three in number to start with and go up to a group remotely placed working on a call-center approach. These moderators view the question posted and forward it to target expert. In case the answer is required urgently they could call up the expert to get his feedback. They could **themselves** answer questions if applicable or at run time forward relevant links or similar questions asked earlier to the user. Thus, users get their feedback immediately when he is still online. Moderators could also be people who classify each question asked on aAqua into meaningful categories, update content and keep a quality check in the service provided. They will be the efficient human link between the users and the experts (questions and the answers). As we are able to put more intelligence into the system with meaning based search much of the moderators work could also be automated. **Point C:** Experts could be associated to an institute like KVK Baramati, any other agricultural institute or be local experts who has relevant experience in their area, example- green house, animal husbandry. The questions answered by these experts could be reviewed and approved by institutional experts for archiving in the aAqua database. Scaling-up of aAqua will accentually need the creation of information repository to help meaningful [7] and contextual information for both: pull & push [6]

7.0 Uniqueness of Question & Answer system when compared to other systems

Information seeking behavior could be broken into three primary components [8]: 1) A perfect catch: When a user is looking for an exact answer, where he knows what he wants and where he'll find it 2) Lobster trapping: When

looking for more than a single right answer, and wants to compare them to take his decision 3) Indiscriminate Drift netting: when he does not want to leave any stone unturned, does ego surfing to find out all related information of his interest. Our model of **Question & Answer** does not strictly fall in any of the above categories. It is definitely a combination of the first two and more. Here the user wants the exact contextual information but does not know how and where to find it. His knowledge base and awareness/learning will increase if he also “starts browsing” contextual and multilingual information available in aAqua’s database. But he will start exploring only when relevant information is **pushed** to him. The diagrams **Fig: 1.7, 1.8** below describe the conceptual models for: End Users, Moderators and Experts.



Fig. 1.7: User’s Conceptual Model

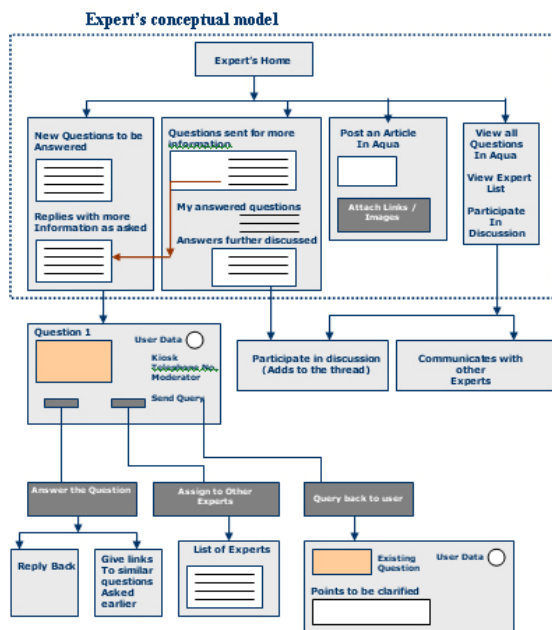


Fig. 1.8: Expert’s Conceptual Model

8.0 Redesign for aAqua’s next version User Interface

The next version of aAqua interaction will have three distinct components at global level: 1) Question & Answer 2) Forums 3) A clearing house for dissemination agricultural information. Figure 3a shows logged in home of a user who has made his query. User after typing his question does a quick search for answer. If the answer is in the database he gets a search result page with: similarly asked questions and links to related topics. Note: He can do this before logging in. If not satisfied he can go ahead and post the question after logging in.

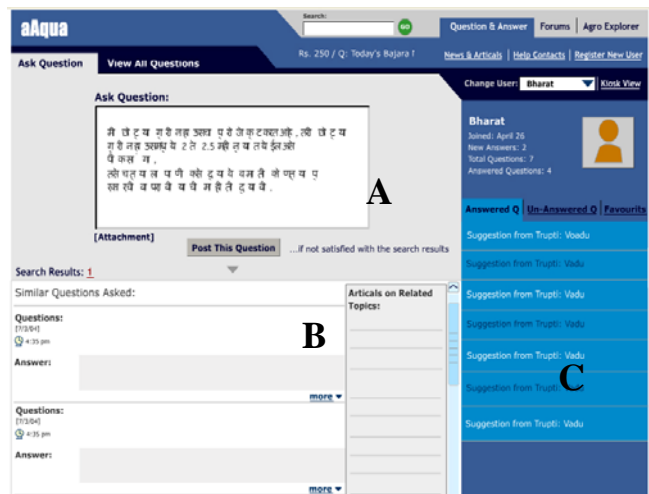


Fig. 1.9: User Interface for End users (J2)

With reference to **Fig 1.9** we have the following components- **A**: Place where user types his question to be searched, **B**: User immediately sees a search result page below his questions. This result page has similarly asked questions (if similar questions are in the database) and articles on similar topics (from the content repository) and, **C**: a vertical slider navigation at which use can at anytime shift focus without losing current context. From here the logged in user can check his: Answered Questions, Un-Answered questions and his Favorite threads. When not in user the user can close the right hand side slider navigation to view a bigger content page.

9.0 Urban vs. Rural context needs and user behavior (kiosk usage pattern)

In an urban scenario people use kiosks to get contextual or related information subjected to the environment they are placed in. Example kiosks in the airport could be used to see booking status or hotel reservations, similarly used in railway stations, shopping malls etc. ATM kiosks are used to do work transactions as an extension to Banks. Cyber cafes are point of access for internet. But remember they exist as a redundant point when compared with access of internet from personal computers in offices, homes, schools

etc. An urban user can check his mail from the cyber café, reply from home and check the response from office. Thus, feedback or update of interaction through net need not be given to the user in any other form (eg. Mobile phone etc) since he can access internet anywhere, at any time. But in a rural scenario the present access of internet is only through one point: i.e. the information kiosks. Similarly as an urban user rural user may require feedback and update of information at any point from any where. This is very applicable to the success of our venture of question answer system. When a question is asked from a kiosk the only way the user can check its answer is by going back to the kiosk. Can a user get this information away from the kiosks, at their homes, work place, when mobile? This scenario is discussed in detail in our next point (10.0)

Future Work and Focus for aAqua:

10.0 Multimodal system interaction for: information query, retrieval and dissemination

The sequence diagram for multimodal interaction is as follows:

- User goes to a kiosk and asks his question in aAqua
- He get an automated feedback that his question will be answered in lets say a day's time
- When expert replies to his question users gets an automated feedback on him mobile (SMS) that his question has been replied.
- The expert could directly talk to the user in case of any clarification required
- If more details are required regarding his question the user could be contacted on phone (cell or landline), say he can be told to attach an image of his diseased crop
- The user could also view his question and answer received on his mobile interface. For detailed description (with photo reference etc.) he could go back to the kiosk and access aAqua
- More-over the initial question could have been initiated through the mobile interface. Later further dialogue and detailed information could be given through a kiosk
- The point is that tomorrow if a farmer / group of farmers purchase their own computer then the dependency on the kiosk is ruled out. Plus, added value is provided when aAqua system's interaction interface extends beyond a kiosk computer: as described above.

11.0 Future work and research issues

Future work in progress focuses on:

- Improving the quality of services through the present question answer system

- Help and encourage users to create contextual content
- Introduce browsing and searching through a content repository along with database of question and answers
- Help experts to create and manage content by adding articles, monthly reports, updates, forecasts etc.
- Enabling aAqua to also work as a clearing – house of information in Agriculture domain
- Merging Question & Answer system with Meaning based /multilingual search [ref.7]
- Introducing information architecture for a vertical solution for content management, dissemination and retrieval

12. Conclusion

aAqua provides language independent discussion services which are not limited to text and can have audio-visual elements to provide a simple, yet rich interface accommodating novice users. The above objective has been successfully achieved [1]. Usability study gave insight into new interaction models that would add value to the quality of services provided. Scalability issues are being addressed for making aAqua self-sustaining for both creation, dissemination and management of information relevant to Rural context.

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