Wonders Knowledge Portal

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Abstract

Starting from 2002, Wonders Information Co., Ltd., a medium-sized software company located in Shanghai, China, started building a knowledge management system that attempted to facilitate knowledge sharing between its employees. This teaching case describes how the system was conceptualized, designed, built, and used. In doing so, we wish to provide a context for in-depth discussion on designing and using knowledge management system, especially in small and medium-sized enterprises.

Keywords: Small and Medium-Sized Enterprise, Knowledge Management, Knowledge Management Systems

Even if it was 2002 and deep in the so called “the winter of IT industry” in China, things were going well for Wonders Information Co., Ltd, who positioned itself as the leading company in the Chinese city informatization market. Under the board’s direction of “core competencies first, scale second”, the company took on “pursuing competitive advantages through improving both internal processes and customer interactions”1. Among the top items on the agenda was to invest in a knowledge management system.

1. Background

Wonders Information Co., Ltd. was originally a prestigious research institution. The current company was incorporated in December 1995. After a couple of years of exploration, the company started to concentrate on the city informatization market in 1997, when it successfully developed the Shanghai Industrial and Commercial Administration Information System. This project, together with its later successes in a few highly visible projects – such as Shanghai Social Security Management Information System, Shanghai Medical Insurance Management System, and Pudong International Airport Management Information System – established Wonders’ leading position in the city informatization industry in Shanghai and in China. Meantime, the company had been growing at a brisk pace. By 2005, the total number of employees had increased from 50 to more than 500. Headquartered in Shanghai, the company had branched into cities across China. Although the majority of its revenue still came from Shanghai market, revenues from non-Shanghai markets were becoming increasingly important: they had at least doubled every year between 2000 and 2003, and were expected to reach 25% of the total revenue in 2004. In 2002, Wonders also opened a child company in Silicon Valley in the U.S.

The business had also expanded. Starting as a software developer and system integrator, in 2004 Wonders provided consulting service, system integration, application software development, and outsourcing service. While consulting service and outsourcing service contributed about 20% to

1 http://www.wondersgroup.com/chinese/cityinfo/talkshow.htm as of March 9, 2005
the revenue, system integration and application software development each contributed about 40% to the revenue. Most of the revenues were generated through nearly 20 business departments, which were grouped into four business divisions, each competing in a market segment: e-Government, social security, public service, or business service. A fifth division provided system integration supports to other business divisions. Typically, projects were handled by business departments with helps from other functional departments such as marketing and legal department. For example, when the marketing department received a project lead, the information was passed onto a certain business department. The business department would then lead the bidding effort. If the project was won and the contract was signed, the business department would handle the system development until the contract was fulfilled. The maintenance of developed system was, however, switched to Maintenance and Service Department, which was independent of other business departments. The five business divisions in total had about 300 employees, most of which had at least bachelor’s degree. In addition, an independent R&D center employs about 25 researchers, more than half of which had at least master’s degree. (See Exhibit 1 for Wonders’ organizational chart.)

1.1 The Need for a Knowledge Management System
The fast growth of the company also put the needs for better knowledge management on the agenda. As Dr. Donald Lee – the chief technology officer, VP, and the executive champion of a knowledge management system (KMS) – explained:

   We had to be concerned about how to reduce the cost and how to promote our core competencies. Software companies, especially companies like us who major in system integration and software development, depend greatly on employees. Especially, our company’s core businesses are projects. We need an enormous amount of knowledge in project bidding, authorization, development, deployment, and maintenance. Much of this knowledge was stored with individual employees, in their computers or in their brains. It was very difficult for other individuals to share this knowledge…. We needed to build a system to accumulate, exchange, and share this knowledge, thus reducing our dependency on individual employees, and cutting the cost in project implementation.

In fact, the needs for more efficient knowledge sharing were felt across organization hierarchies. Dr. Jennie Chan, a project manager in the R&D center, recalled:

   There were little communications between business divisions, probably because every division had its own budgets. The divisions used to even have their own sales person who contacted the customers and signed project contracts. There were all parallel to each other.

Dr John Cheung, the project director in the R&D center, further noted:

   We had grown bigger. There were many more departments and many more employees. In addition to the Shanghai headquarter we also had branch offices in other cities. Each department had different focuses, and nobody knew all. If I were to use certain knowledge, I would certainly wish I could get it through knowledge sharing. Doing so would also be cost efficient: you would rather contribute only once and make it available to everybody than responding to the same requests again and again.

The idea of building a knowledge management system surfaced in late 2002 and was quickly approved. Donald commented on the goal for the system:
We view knowledge as our most important strategic resource, and we believe to be able to maximally master and apply knowledge is critical to our core competencies. Therefore, the system was targeted to improve the productivities of our knowledge workers, to expedite our response to environmental changes, to innovate our business model, and all in all to enhance our core competencies.

The project officially kicked off in February 2003. The R&D center was awarded the project due to its involvement in corporate information management and its experience in organizing and reusing corporate software assets. John and Jennie also became members of the project management team.

2. Design the Knowledge Management System
As the first step, the designers had to tackle the ontological question: what is knowledge? Or rather, what should be managed by the KMS? “We define knowledge in a very broad way,” explained Donald:

“We define it as valuable information that is relevant to any aspect of our business and management, such as sales, customers, competitors, technologies, products, employees, suppliers, partners, business processes, etc. That is, knowledge is not limited to files or documentations that are related to technologies and products. As long as the information is relevant and valuable to our business and management, we take it as knowledge. Of course, there are two types of knowledge. One is explicit, visible, as stored in files or documentations. The other is tacit. The tacit knowledge has to be unearthed through knowledge exchange. We have to take care of both. Only in so doing can we build a comprehensive knowledge management system.

This broad view of knowledge as useful information and the emphasis on tacit knowledge as well as explicit knowledge greatly influenced the design of the KMS. Instead of being an isolated system focusing on technology or product knowledge, the KMS was deemed from the beginning as part of the corporate information infrastructure, and great efforts were taken to make integration with other systems possible and easy. Accordingly, the whole system was to be implemented in four phases. The first two phases concerned the KMS, with the first focusing on the explicit knowledge and the second on the tacit knowledge. In the third phase, the Office Automation (OA) system will be integrated with the KMS, and workflow engines will be used to facilitate the automatic knowledge collection. Finally, the KMS will be connected with other systems such as Customer Relationship Management (CRM) and Human Resource Management (HRM) systems, and to be fully integrated into the corporate information infrastructure. (see Exhibit 2 for system infrastructure.)

2.1 Managing Explicit Knowledge
Wonders had generated a tremendous amount of explicit technical knowledge – e.g., documents (such as reports and project documentations) or software components – ever since it was founded. There were some efforts to categorize and reuse it in the past. But without a corporate KMS, such efforts were sporadic and mostly within individual business divisions. Sharing

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2 Even though the informants emphasized the differences between information and knowledge, they often use the two terms rather liberally. In most cases, it should be not difficult for readers to determine what the terms exactly mean from the context.
explicit knowledge across divisions proved to be difficult, if not impossible. The KMS project provided Wonders with the first-ever opportunity to systematically manage their explicit knowledge.

An efficient and effective way to describe and categorize the knowledge was essential to allow users to search for and identify the knowledge they needed. The project team designed an object-oriented way to describe knowledge: each document or software component was considered an instance of a template. Key to each template is a set of properties that were used to describe the knowledge. These properties were also the dimensions along which the knowledge could be searched and identified. Values of these properties must be provided by a user when submitting a piece of knowledge. That is, to describe a piece of knowledge was to first identify the right template, then create an instance of the template, and finally fill in appropriate values that correctly represent the knowledge for the properties defined in the template.

To categorize knowledge, a tree-structured, hierarchical organization was designed. For example, one of the top categories was product information, which had four subcategories: security, network, system software, host and storage. Security was further categorized into a few third-level categories, such as antivirus, firewall, anti-spam, etc. Knowledge on Norton Antivirus would fall under category “product information – security – antivirus”. All submitted knowledge must be categorized until the lowest level of the hierarchy, and a piece of knowledge may be put under more than one categories.

The templates and the hierarchy were developed by the project team, together with representatives from business divisions. In some cases, existing templates were adopted. The project team was confident that the current hierarchy reflected user requirements. However, such categorizations were dynamic in nature and needed to be constantly updated. For this purpose, an employee from the R&D center was designated as the contact person. Whenever there was a need to change a template or the hierarchy, users would ask the contact person to make the necessary adjustments.

Before KMS, documents and software components were collected from its creators. With KMS, those contents were submitted by its creators. To ensure the quality of the knowledge in the KMS, the submitted contents would have to be first reviewed by an knowledge auditor. Only those passed the audit would eventually be admitted into the KMS. This review process was also facilitated by the KMS.

2.2 Managing Tacit knowledge
Donald imagined three ways in which the KMS would handles tacit knowledge:

First, we used the coordination platform. … Such platforms provided an environment for people to enlarge their scope of knowledge exchange (beyond their local contacts) and to unearth tacit knowledge during their knowledge exchange. The second one was the online forums, which were a good place to discover tacit knowledge. One could put forward a question, and others could come and answer it or discuss it. … The third one was columns. Columns were more for experts to put things in their brains onto the corporate platform. We had experts in all areas. These experts would regularly publish articles in the KMS. All these articles were original. They summarized the experts’ experiences, both their own and those they gained through exchange. By publishing these articles on the KMS, they converted their tacit knowledge into explicit knowledge and made it available to others.
The coordinate platform was designed to provide an online meeting place for employees to interact with each other in real time. The functionalities were similar to those provided by popular online meeting tools such as Microsoft NetMeeting or Yahoo! Messenger. Tools such as multimedia conferencing, electronic whiteboard, and document sharing were provided. The online forums allowed asynchronous discussion between members. Jennie explained:

The forums were originally created in the wish of promoting informal exchanges between employees. No limitation was set on the content. … We did not have specific expectations for the forums, except for providing the employees with a platform to chat with each other. It was also in line with the idea of free expression. Documents must go through the submission (and review) process, and could only be put into the knowledge base auditors after reviews. Columns were for experts. Neither was for average employees who just want to write something. Therefore, we needed a place like the forums.

The online forums were organized by subjects. They were operated much in the same way as typical online forums that populated the Web. However, anonymous postings were not allowed. To post a message, an employee had to first login with his username and password. Columns provided the space for experts to share their experience or their thoughts with others. Articles contributed to columns were not as organized or as subject to categorization as aforementioned documents. They were meant to capture the experts’ experience or their viewpoints regarding certain topics. The experts for each column were initially identified by the project team. While only experts can contribute to columns, everybody could read the articles in the columns. The KMS also allowed readers to interact with experts. For example, the readers could ask the system to direct their questions to a particular expert or all the experts in a certain column. All such interactions with the experts within the KMS would be logged by the system and made available to all readers.

2.3 Accommodating Useful Information
Some information in Wonders was not related to technologies or products, but was important in improving employee productivities and even critical in securing business opportunities. Such information was also put into the KMS. John gave two examples:

Most employees did not know administrative procedures such as how to get reimbursed at all. All they could do is to ask the secretaries. Even secretaries sometime were not quite sure of what to do, especially when there was a change in the policy. Without the KMS, the only way for the company to notify the changes was through broadcasting emails to all employees.

When we were bidding for a project, it was important to put in information on employee qualifications. For example, we might need to know how many employees have certain CISCO certifications. Without the KMS, we could only take a guess and put the estimation in our bid, which was not quite the right thing to do.

2.4 Promoting System Usage
While the design team believed that profound changes in organizational culture were needed to promote knowledge sharing in Wonders, the team also believed that by entertaining some design considerations they could also motivate the use of the KMS and consequently increase the
knowledge sharing practices to a certain degree. The first of such considerations was to make the KMS the homepage of the Intranet. Donald elaborated on why:

From the corporate perspective, the reason we want our employees to log onto the Intranet is to find the information they need, or to share the information they own. This is probably different from many other companies, where the focus of the Intranet is Office Automation. … We focus on knowledge, its discovery, its sharing, and its exchange. We have a different point of departure.

The second was to integrate a ranking mechanism in the system. Since all interactions with the KMS were recorded by the system, contributions could be ranked with some technically straightforward analyses of system log, for example, by the hits they received or by the amount of feedback they received from readers. The design team believed that doing so would not only help directing employees to the most popular contributions, but also provide some motivations for employees to contribute to the KMS.

Lastly, the design team decided to grant the online forums more freedom in creating topics. Spaces were even reserved for recreational topics. After all, as Jennie explained, the online forums were to provide an online space for employees to express themselves.

2.5 To Buy or to Build
After finishing system design, the project team set off to review the off-the-shelf products. Donald summarized the review process:

At the beginning, we wanted to choose from more mature, off-the-shelf products. Because we didn’t think there were one single big player and one most prestigious product in knowledge management software market, we checked out products from a few companies. We found that there were some gaps between the products and our requirements. Given these gaps, as well as considering the cost and timeline of our project, and the fact that we ourselves were a software company, we decided to build the system by ourselves.

At the end of 2003, the first phase was finished. The second phase was completed one year later. The KMS after the two phases was named Wonders Knowledge Portal (WKP), and was set as the home page of Wonders intranet.

3. Wonders Knowledge Portal
Exhibit 3 shows the homepage a user saw once he logged onto the WKP, or for that matter, the Wonders intranet. KM functionalities were provided in channels, which were listed right below the title bar.

3.1 Accessing Useful Information
Useful information was organized in four channels: news, company, HR, and projects. The news channel includes mainly recent corporate news or press reports on the corporate. The corporate channel presented information on the company, such as introductions to organizational structure, products, research projects, corporate certifications, and policies. Both channels are maintained by CEO’s office.

Human resource channel focused on employee training and certifications. HR department, the owner of this channel, would post the available training opportunities to this channel. Once an employee received training, or passed a certification exam, the information was submitted to this
channel and the database was updated after the information was verified by the HR department. This channel also contained a database on employee skills. The tree-structured, hierarchical skill categorization was created and maintained in the similar way to how explicit knowledge hierarchy was created and maintained. All employees were mapped into the database based on their skills. HR channel also provided a search interface through which employees with certain skills, certain training, or certain certification could be located.

Projects channel provided the interface to other systems. After a user successfully logged onto the WKP, from here he could choose to enter the other systems that he was authorized to use. The WKP also provided a personal channel and a mail channel. The personal channel allowed users to modify personal information, review past contributions, check submission status, and perform certain task. For example, if a user was an expert, the system could present him with a list of questions that were directed to him. The mail channel was simply an entrance to the user’s email system.

3.2 Managing Explicit Knowledge
The explicit knowledge was managed by two channels, document center and software assets. In WKP, documents contributed through the document center channel were called articles. Document center channel homepage listed the highest two levels of the explicit knowledge categorization hierarchy. Users could browse the articles by clicking on these category items, and further choose from the list of lower-level hierarchies or articles. Links to search pages was also displayed on the homepage (See exhibit 4 for document center channel homepage). Software components were managed through software assets channel. The interface and functionalities provided by this channel resembled those provided by the document center channel.

On all pages in both channels there was a “Contributing knowledge” button. Clicking on this button would lead a user to a process through which the user can contribute a piece of knowledge, i.e., an article or a software component depending on which channel the user was visiting. The user would first choose the category or categories to which the knowledge belonged and then choose the correct template. The template would then guide the user to fill in the values for all properties. If successfully submitted, the article or the software component would be sent to reviewers for verification before it was admitted into the knowledge base.

3.3 Managing Tacit knowledge
Consistent with the system design, tacit knowledge was handled in three channels: forums, columns, and coordination. The forums channel homepage resembled the interface of typical online forums, and so did the functionalities. The coordination platform was not developed from scratch: it was customized from a popular WebEx product.

The columns channel homepage displayed a list of all columns, together with the articles and the list of experts in the columns. Clicking on the articles would display the articles in a new page, which also allowed readers to provide feedback to the expert who authorized the articles. While the list of the experts was displayed with numerical bullets, the numbers were not meant to rank the experts. Clicking on the expert names would lead to a page through which users could send their questions to the experts. As explained before, all these interactions between column readers and the authors were automatically recorded by the system.
3.4 Ranking Channel
By the end of second phase, the system could only rank articles contributed to the document center channel and the columns channel. There was no ranking on the postings in the online forums. Ranking channel homepage listed the ranking results, part of which was also displayed in the WKP homepage. Clicking on particular items listed in the ranking channel would lead to a page that displayed the content of the item.

3.5 Current User Base
In general, all employees were users of the WKP: a permanent account was created for every employee to access the WKP. A users’ privilege on the system was determined by his role in the organization and his job description. For example, while all users could browse news, only certain user designated by the CEO office could upload news or edit news.

4. Present Status of Wonders Knowledge Portal
4.1 Usage of the WKP
As soon as the first phase development ended, the system was put into pilot test. A memo declaring the pilot test was sent to all employees. In addition, the R&D center hosted a few activities in two of the business divisions, attempting to promote the awareness of the WKP and to train the employees on how to use the system. The other three business divisions knew about the system, but were not targeted for any formal promotions. Jennie commented on the results of such promotions:

We do not have statistics on the usage yet. Although untrained colleagues are free to use the system, I feel that those who were trained are more likely to do so. Even if they didn’t know the system or would have never used the system, those who were trained are likely to try it after training.

Donald was more concerned about managing tacit knowledge than explicit knowledge. He explained:

At the time of designing the system, we put equal emphasis on explicit and tacit knowledge. But from what is happening right now, most activities are on explicit knowledge. After all, it takes time and efforts to discover tacit knowledge. Consequently, sharing tacit knowledge is not as much and as fast as sharing explicit knowledge.

Interestingly, Donald’s concern was both shared and contradicted by opinions from experts. One expert seemed to agree with Donald. He franked acknowledged, “My job was to develop specific projects. I would love to benefit from the columns, but probably would not be able to share my thoughts or make any other contributions.” Another expert who actually had contributed suggested that although the idea of experts and columns was good, it didn’t work because “there was simply too little knowledge contributed by the experts, and too little contributions to review by the experts.” To him, contributing to the columns didn’t cost too much at all:

Because I needed to use knowledge in this area in my project, I did a little research and organized the information I found from the web a little bit. I found that a little more work will make what I’ve got a pretty complete article. With a little formatting and a little editing, I put it into my column. I spent little time making this article ready for the column, at most 15 minutes. In fact, I don’t really care whether it worth my time and
efforts or not, just wishing it would be helpful to those who will work on this in the future.

It was difficult to pinpoint why the usage of the system was not as much as expected. To Jennie, the missed link between the corporate motivation mechanism and participating in the WKP and especially contributing the WKP could be blamed:

Currently we are still asking the employees to contribute their knowledge to the WKP out of altruism. … Contributing to the WKP is not linked to the motivation mechanism. Many a time the top management has to push the employees to participate. For example, the R&D center had done a lot of work that could be summarized and submitted to the WKP, but nothing happened. Finally Donald sent out an email asking for it. The next a few days contribution to the WKP increased a lot. But normally we have much fewer contributions.

4.2 Benefit from using the WKP

Even with the limited use, the benefits were being felt. Jennie herself was a beneficiary when she was leading a project bidding: Her team needed a member with expertise in Lotus Domino. Since Lotus Domino was not used much in the company, neither she nor other team members knew the right person. Nevertheless, a simple search on certification information under the HR channel solved the problem in no time.

A manager also mentioned how his department took advantage of the WKP:

A lot of times when we were trouble-shooting systems, we spent a lot of man-hours only to find that the dramatic drop in system performance were caused by some same simple errors in the codes. We now can expose these frequently-made, simple errors on the WKP, and make it possible for the programmers to learn from the mistakes.

To some, WKP was now considered an important outlet – if not more important than other outlets – for knowledge sharing. The assistant manager from the Maintenance and Service department told the following story:

At the end of 2003, we were performing a scheduled examination on a customer system. Suddenly the system crashed. It turned out that our scanning tool scanned a bug in the system. Such scheduled examinations were routine practices, and we didn’t expect any problem. Unfortunately, we were brought down this time. After this accident, we decided that risk levels must be estimated before all scheduled examinations. If there were a risk, precautions must be taken. To prevent us from making the same mistake again, we summarized this accident and the posted this case on the Maintenance and Service online forum. We were required to write up such accidents by our quality standard, which has not been connected with the WKP yet. But since this accident had too much impact, the summary made its way to the WKP.

In fact, Jennie was very impressed by how Maintenance and Service department had transformed its online forum into an important space for knowledge sharing:

The Maintenance and Service Department use an online forum to discuss the problems they encountered, such as what to do when a computer had a problem or caught a virus. Right now, this forum is hot. We didn’t expect this. We designed the online forums to provide a space for employees to post messages informally, to communicate with each
other. We expected to collect knowledge through formal methods. In the end surprisingly the knowledge was collected through such informal forum.

Nevertheless, what amazed John most was not how the system was used, or how much employees benefit from using the system. He explained:

While this platform allows the employees to be exposed something and to communicate with each other, this is just part of the story. I think what is even more important is that through building and promoting this knowledge sharing platform, we now have a much better atmosphere for knowledge sharing and a much better awareness of knowledge sharing among all the employees. I can feel this very clearly. Before, we just worked on our own products, or on research projects. Even when we were working with other business divisions on customer projects, they didn’t quite care what we were doing. Now, when the business divisions work on a project, they often would come to ask us what we have, either directly or through Donald.

5. Future of the Wonders Knowledge Portal

First feedback from users concentrated on two directions in which the WKP could be improved. The more imminent improvement was to expand the reach of the WKP. Currently the WKP could only be accessed from within the Shanghai headquarter. There was no way to connect to the WKP from outside the headquarter. To make up for this, the system allowed users to subscribe for certain information. When the information became available, it was pushed to the users by email. However, such subscription could not meet the requirements of users who worked on customer premises but needed to search for knowledge on the WKP. Nor would it satisfy the needs by employees of branch offices. A VPN connect was desperately needed to allow such remote connections.

Some users also felt that the functionalities provided by the WKP could be further improved. For example, the online forums could be better organized; the search engine could be refined; the organization of the knowledge/information could be better integrated with the business models and business processes; some part of the user interface was not so easy to use; and certain misunderstandings between system developers and users needed to be resolved.

While some users expressed concerns over how much the new system would be used and how much knowledge would be contributed to the WKP, Donald remained optimistic:

At a matter of fact, many employees will not use the WKP as the only way to acquire knowledge. There got to be other channels. However, employees should not resist the system. It is a good thing to have one more channel to acquire knowledge. They should embrace the system. I think the acceptance is increasing. Users may more and more take the WKP as something they have to read everyday. Of course, this has to involve changes in organizational culture, that is, whether all employees would like to share what they know, or they just want to read what others contribute. … There is certainly nothing wrong with reading. But we hope more will take part in organizing and contributing knowledge. This is what we have been striving for.

And he is confident in the future of the WKP:

As far as system functionalities are concerned, the WKP reaches the design goals. The next phase will be about how to promote it and how to extend its use. That is, how to take best advantage of the system, and how to increase user participation. We will think of some measures – for example, linking participation in the WKP with employee
performance evaluation – to really realize the functionalities we designed. Given that we already have all the functionalities, we just need to keep making improvements.
Exhibit 1: 2005 Wonders Organizational Chart
Exhibit 2: System Infrastructure and Implementation Stages
Exhibit 3: Wonders Knowledge Portal Homepage.

Channels (from left to right): Home, News, Corporate, HR, Projects, Forums, Documentations center, Software assets, Columns, Coordination, Ranking, Personal,

Wonders Knowledge Portal

Login in

Search

External Links to:
Online forums
Java Chinese
Chinese Java
JieYi Software Studio
...
KM sites
Java Home
BEA online
...
Online experts:
FreeLamp
Computer Application Digest
Linux paradise
...
Misc. links:

Button to contribute knowledge

Wonders News
Left list: most recent news
Right list: most recent memo

Wonders Forums
Left list: most recent important posting
Right list: hot postings

Wonders Documentation Center
Left list: most recent document
Right list: hottest document list

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Exhibit 4: Document Center Channel Homepage.

- Standards:
  - Technology standards; Business standards
- Product Information:
  - Security; Network; System software; Hosts and storage
- Questions-Base:
  - Security; Network; System software; Hosts and storage
- Technical Information:
  - Security; Testing; Components; Database; System administration; Application development; Host; Middleware
- Marketing:
  - Executive digest; Market report; Competitors; Exposure Information
- Business area:
  - E-Government; Public service; Others; Business service; Enterprise informatization; Social Security
- Quality Management:
  - Quality assurance; Quality infrastructure

Search engine. The text inside the textbox reads “Please type in keywords” and the button reads “Search current category”.

“Contributing Knowledge” button

Input information and search.