Fostering Community Preparedness to Cope with Drought: new initiatives and results from a study involving ODL and ICT from South Central India

Theme: Social Justice
Sub-Theme:

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ABSTRACT

Drought has emerged as a key concern in the context of climate variability induced by Climate Change processes and over a billion people are vulnerable, according to UN estimates. Drought preparedness is recognized as the preferred way to cope over relief, and information is the key. Improved access to contemporary ICT in the form of mobile phones and the Internet can help address the challenge of information deficiency in this matter. We have tried to develop an integrated approach for improving the capacity of rural communities by bringing together agricultural information with methods of ODL and effective exchange or delivery using video-conferencing. This has also enabled skill building among vulnerable rural communities in the use of color-coded maps derived from satellite imagery and GIS platforms. ICRISAT in partnership with a community based all- women micro-credit organization, the Adarsha Mahila Samaikhya (AMS), in South Central India has developed this blend of techniques to help the AMS and rural communities to anticipate how vulnerable their villages would be to drought in a season. This is an ongoing partnership, and we report here on joint studies carried out during March 2008-September 2009.

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INTRODUCTION

Drought and Desertification are serious problems that significantly affect millions of people in the Semi Arid Tropics (SAT), which receives an average annual rainfall of less than 1000mm. Drought varies with regard to the time of occurrence, duration, intensity, and extent of the area affected. It is broadly classified into three types: meteorological drought indicates the deficiency of rainfall compared to normal rainfall; hydrological drought indicates the scarcity of water in surface and underground resources; agricultural drought occurs when the rainfall and soil moisture are inadequate to meet the water requirements of crops (Sinha Ray, 2000).

International experience in drought mitigation and management has led to the suggestion that drought preparedness is better than relief and that information is the backbone of drought preparedness. The Science and Technology Commission of the UN Convention to Combat Desertification and Drought (UNCCD) has recommended the adoption of a communication system that combines top-down approaches with bottom-up approaches and community mobilization, to enhance preparedness (UNSO, 2000).

There is lack of sustained information, education and social mobilization in strategic sectors to mitigate the drought conditions. In the recent past new ICT tools have produced significant transformations in several sectors of the society including agriculture. They also have the potential to transform the different roles in the learning process. The increased use of ICT to deliver and enhance aspects of educational provision is now an emerging practice for all learners belonging to rural and geographically remote and mainly monolingual areas thus having advantages in overcoming geographical barriers. For example, video conferencing facility enables isolated learners to share learning with others in remote areas. We have tried to develop an integrated approach for improving the capacity of rural communities by bringing together agricultural information with methods of ODL and effective exchange or delivery using new ICT tools. ICRISAT in partnership with a community based all- women micro-credit organization the Adarsha Mahila Samaikhya (AMS) developed blend of techniques to help the AMS and rural communities to anticipate how vulnerable their villages would be to drought in a season. This is an ongoing partnership, and we report here on joint studies carried out during March 2008-September 2009.

VIRTUAL ACADEMY FOR THE SEMI-ARID TROPICS (VASAT)

Virtual Academy for the Semi-Arid Tropics (VASAT), which initiated in 2002, by ICRISAT with aiming at sharing information, knowledge and skills related to issues on drought, best practices and other issues. VASAT had used interface of ICT and distance learning methods to reach large section of communities in a short period of time. The main object of this project is to create the content on demand basis and deliver it in local language and the intermediaries convert local terminology to scientific terminology and vice-versa so that they can clear their queries. (http://www.icrisat.org/vasat)

ADARSHA MAHILA SAMAIKHYA: PARTNER IN THIS STUDY

The *Adarsha Mahila Samaikhya* (AMS- the *Adarsha Women's Welfare Organization* in English), is a federation of all-women micro-credit groups that functions in Addakal Mandal in Mahabubnagar, and has a membership of about 8200 women covering all the 21 revenue villages in that locality. The AMS has been functional since 1994 addressing various developmental issues of rural families in this area, and has developed a campus of its own.

ICRISAT is imparting non-formal education to rural families, with the support of the Government of Andhra Pradesh and has set up an internet-connected hub in the AMS premises and has built the capacity of the AMS volunteers in info-mediation (http://www.icrisat.org/vasat/pilothub/index.htm). ICRISAT and AMS had set up Village knowledge Centers in eight villages with PC's and Internet access. ICRISAT has established a videoconference facility at the AMS with the help of Indian Space Research Organization (ISRO)/National Remote Sensing Centre (NRSC) to support the rural communities in learning recent advances in the latest agricultural techniques and to seek support in solving the real time problems. Videoconferencing provides direct communication between expert's and farmers on various issues and to get relevant and timely information. Over the last two years, ICRISAT has been using an experimental web-to-mobile phone communication platform designed by the Indian Institute of Technology Bombay (www.aaqua.org) to send out highly focused messages to interest-based groups of farmers and others resident in the 21 contiguous villages.

METHODS

Study area

Addakal (Figure 1) is located within the Latitude of 16^{o} 28’ 28.3” N to 16^{o} 41’ 1.98” N and Longitude of 77^{o} 2’ 47.34” E to 78^{o} 2’ 47.34” E with an elevation ranging from 380 -647m above MSL (Mean Sea Level) and extends over an area of 196 sq km. Its annual rainfall varies from 391.0 to 542.6 mm and it is classified under the Southern Telangana agro-climatic zone. It has a cluster of 21 villages with 13 hamlets, spread over an area of 19,397ha; 15% of this area is irrigated land, 60% rain-fed and remaining 25% considered as waste land. This region has experienced frequent droughts over the years and mass out-migration of people has been noticed and reported in the last 10 years.

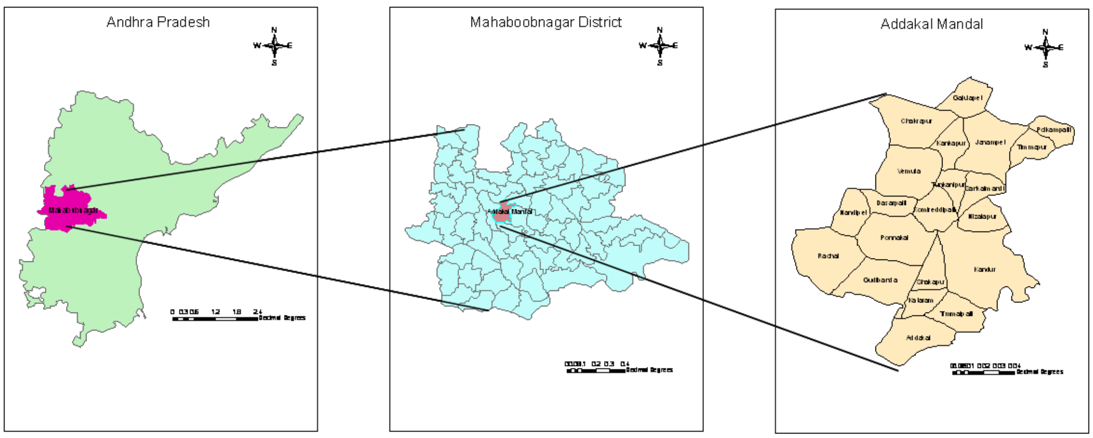


Figure 1 Study Area: Addakal Mandal, Andhra Pradesh, South Central India.

According to the census of India 2001, the population of this area is 46,380 (Male: 50.57%, Female: 49.43%) and 35% y Over 75% workers are engaged in agriculture, dairy farming and allied activities. The main agriculture crops grown in the region are castor, groundnut, maize, chickpea, pigeonpea, sorghum, pearl millet, paddy and orchard crops.

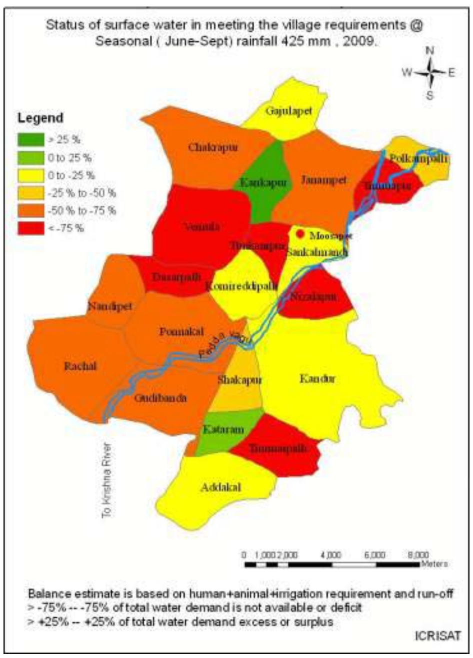
Developing Micro-level Drought vulnerability maps

We adopted a GIS-based framework developed by the Indian Institute of Technology, Bombay (IITB)(http://www.csre.iitb.ac.in/) for developing micro-level drought vulnerability maps. This had been earlier tested on a pilot basis in Addakal mandal (Dileepkumar et al, 2007). The study has shown that the color-coded maps generated are easily understood by a rural resident and he/she could get an idea as to how vulnerable his/her village was to drought in a season.

In this study initially we carried out a survey with the help of Global Positioning System (GPS) and collected the ground-truth information. We assessed the spatial and temporal variations of different tanks for their degradation status and feasibility of restoration using thematic maps and satellite data for the cluster of 21 villages in the study area. Information about the population, livestock and crops grown in this region was collected from the Addakal Mandal office. ArcGIS (9.2) software was used to generate thematic maps of drought vulnerability at various rainfall scenarios using cadastral maps from the Central Survey Office, Government of India, and non-spatial data collected using the Indian remote sensing satellite data was incorporated into the GIS database.

Furthermore, we estimated the water from run-off into these tanks under different rainfall scenarios. We calculated the water requirement for crop irrigation and human and livestock consumption for each village. Deficiency of water availability from the tanks to meet the requirements for each village was estimated. Based on the percentage of water availability/deficit information, that is incorporated into GIS database; color-coded maps (Fig 2) were generated to indicate the drought vulnerable villages.

To make use of these maps, it is very important to know the forecast of the rainfall at the beginning of the season. According to India Meteorological Department's (IMD) press release issued on 17th April 2009 the operational Long Range Forecast for the year 2009 Southwest Monsoon season (June-Sep) the country as a whole would receive 93% of the Long Period Average with a model error of + 5% and the South Peninsula would receive 93% of long period average of 725mm (http://www.imd.gov.in/section/nhac/dynamic/lrf.htm). IMD predicted a normal rainfall for the India as whole whereas International Research Institute for Climate and Society, Columbia University had predicted a below normal rainfall for South India (http://portal.iri.columbia.edu/portal/server.pt). The color-coded vulnerability maps for each village in this study area were based on aggregate rainfall scenario and a dozen such scenarios starting from 200 to 800 mm were generated. Given the varied seasonal rainfall forecasts, the ICRISAT team decided to focus on a potential range of 425-450 mm, about 20 percent below normal.



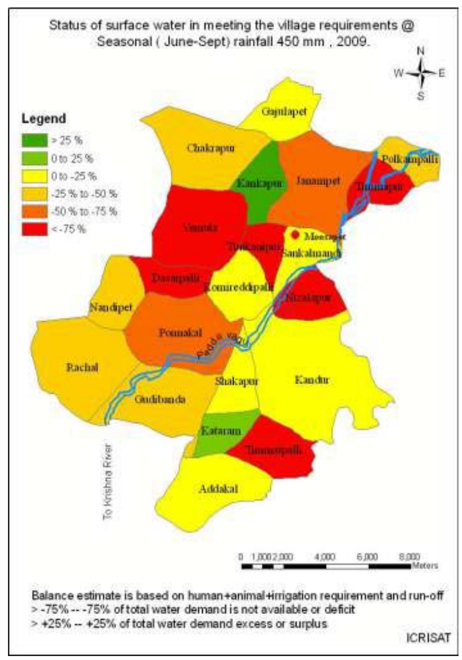


Figure 2 Drought vulnerable villages at 425mm and 450mm rainfall

Building Capacity of Rural Women Volunteers of AMS: deploying open learning methods with re-usable learning objects

For rapid generation of need-based information we have adopted ODL methods with Reusable learning Objects (RLO's) approach using video, audio conferences and mobile advisory facilities. The RLO is a way to practice open learning that combines the advantages of online learning The RLO is a digital educational resource that can be reused, scaled, and shared from an l online repository in the support of instruction and learning. RLO's vary in size, scope and level of granularity ranging from small chunks of instruction to a series of combined resources to provide a more complex learning experience. While designing or developing a RLO there is need to maintain balance between two perspectives. One is conceptualizing content as a part of a larger whole (such as a course, or a curriculum), and second is as stand-alone information at the desired level of granularity. Some more specifications of RLO's are objective based, interactive and self-descriptive. The RLO's of VASAT were developed by adopting SCORM (Sharable Content Object Reference Model) specifications (Dileep, 2006). In this study, we have used existing RLO's in the VASAT web site as baseline and produced new learning objects in Telugu, the regional language on a demand basis. The RLO's were constructed using MS PowerPoint. These were designed in granular form with more images than words.

A reasonable volume of such learning resources on groundnut, chickpea, sorghum, pearlmillet, pigeonpea, plant nutrition management, soil and climate have been made available on VASAT website A special learning resource on "coping with drought" has been developed. This learning resource was primarily used to acquaint farmers, students and others interested in agriculture with drought coping. These learning resources were made available in HTML, flash, PPT and Zip formats. The drought learning resource consists of contents on drought definition, features, causes, affects, impacts, weather forecasting, drought prediction and finally planning to mitigate drought. The sub section on strategies for coping with agricultural drought were rendered into Telugu and were used in supporting learning by the women volunteers and farmers in the study area, using a variety of interactive techniques.

Supporting Rural Learning: use of two-way videoconferencing

We have been using a two-way video-conferencing (Fig 3) facility provided by the Indian NRSC the (see above). During these sessions, experts from ICRISAT train the AMS volunteers about the crop and animal production issues by using VASAT learning resources. In addition, the experts also train the volunteers in drought preparedness in the use of color-coded maps on drought vulnerability. Based upon the demand of farm communities, the schedules of the videoconference sessions were prepared and provided to them in advance. The AMS volunteers, who were the principal learners, were trained by using available RLOs' which are designed in very high granular form with images. Along with this, basic computer education is provided to youth and women by providing presentations well in advance.

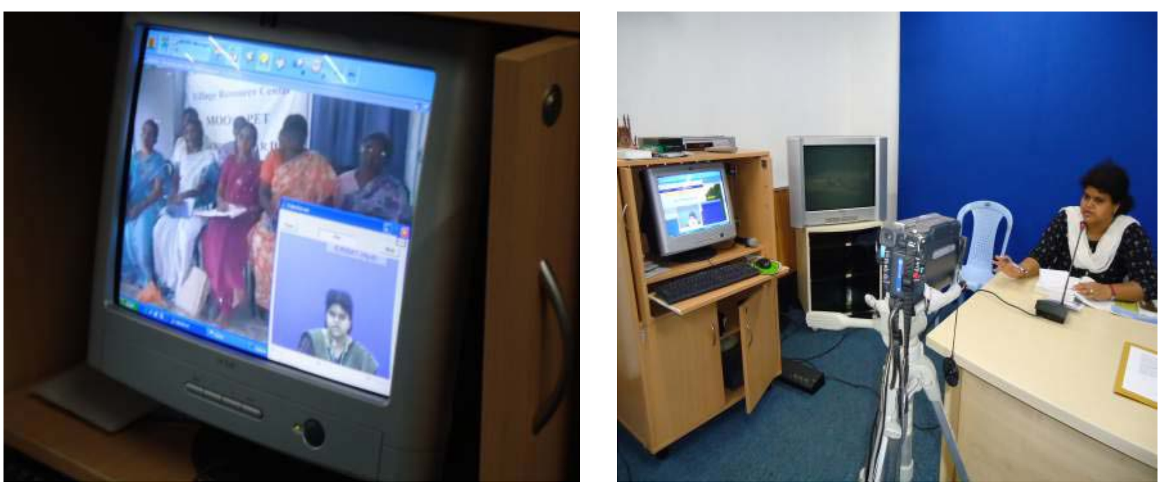


Figure 3: Two-way video-conferencing with women learners in Addakal, AP State, supported by expert center at ICRISAT

At the end of the each session, the volunteers of AMS digitize the content and prepare the l information materials using MS PowerPoint (Fig 4) in locally accepted terminology for further use. This digitized content is validated by the experts in order to built content repository at the village knowledge centres.

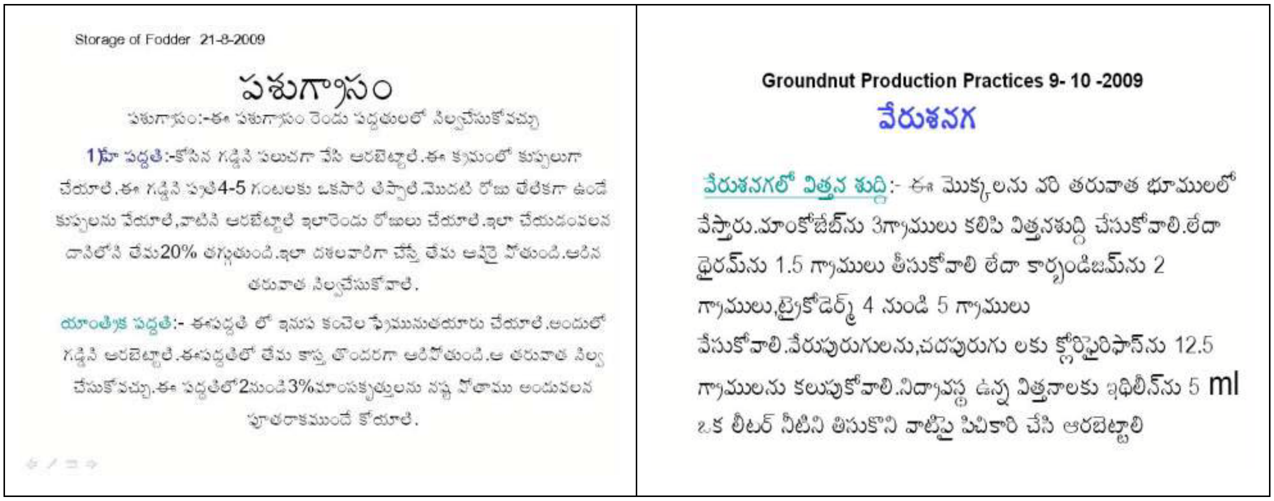
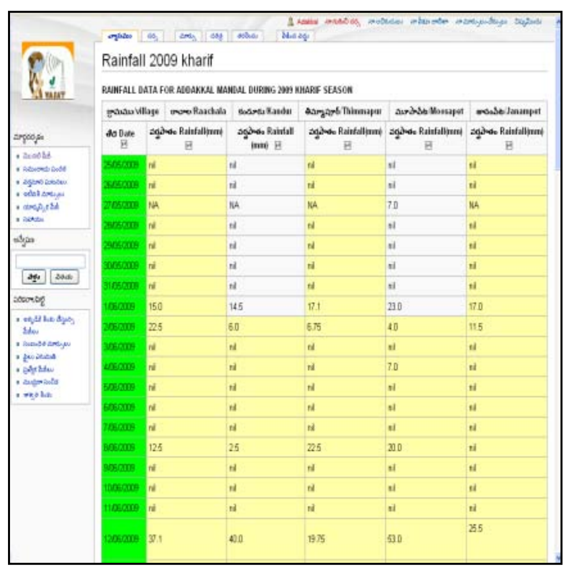


Figure 4: Content prepared by rural women in Telugu language adapting the RLO's

Along with learning, the AMS volunteers in various villages were also well trained in paraphrasing famers' questions for the experts(Dileep, 2005), The usually convey the queries from the farmers not present or unable to attend the videoconference sessions. These queries are reviewed and answered in the respective sessions whereas complex queries are noted down and referred to senior experts at ICRISAT. Apart from this, all these queries are uploaded to an online forum (www.aaqua.org), which has features to enable any registered expert to view the queries and answers. The answer is then communicated to the AMS volunteers during subsequent sessions.

Through videoconference the rural women were also trained in measuring the rainfall and in uploading the rainfall data onto a Wiki-based website (http://vasatwiki.icrisat.org/index.php/Rainfall_2009_kharif) (Fig 5). This data has been used for validating drought vulnerability maps.



Rainfall 2009 kharif

RAINFALL DATA FOR ADDAKKAL MANDAL DURING 2009 KHARIF SEASON

Village / Date	Raachala Rainfall(mm)	Kandur Rainfall (mm)	Thimmapur Rainfall(mm)	Moosapet Rainfall(mm)	Janampet Rainfall(mm)
25/05/2009	nil	nil	nil	nil	nil
26/05/2009	nil	nil	nil	nil	nil
27/05/2009	NA	NA	NA	7.0	NA
28/05/2009	nil	nil	nil	nil	nil
29/05/2009	nil	nil	nil	nil	nil
30/05/2009	nil	nil	nil	nil	nil
31/05/2009	nil	nil	nil	nil	nil
1/06/2009	15.0	14.5	17.1	23.0	17.0
2/06/2009	22.5	6.0	6.75	4.0	11.5
3/06/2009	nil	nil	nil	nil	nil
4/06/2009	nil	nil	nil	7.0	nil
5/06/2009	nil	nil	nil	nil	nil
6/06/2009	nil	nil	nil	nil	nil
7/06/2009	nil	nil	nil	nil	nil
8/06/2009	12.5	2.5	22.5	20.0	nil
9/06/2009	nil	nil	nil	nil	nil
10/06/2009	nil	nil	nil	nil	nil
11/06/2009	nil	nil	nil	nil	nil
12/06/2009	37.1	40.0	19.75	53.0	25.5

Figure 5 Rural women measuring rainfall and data uploaded on a wiki page

Learner Support using mobile telephones and audio conferencing

With the widespread availability of mobile phone networks and handsets, in rural areas, , test/SMS solutions were tried out. The granularised text content extracted from RLO's has been sent through text/SMS mode in Telugu, the local language (Fig 6). Relevant farm advisories were also sent according to the crop calendar for the *khari*f season. Only viable or working numbers were used and 123 volunteers opted to receive the messages and participate in subsequent analyses.

Since video conferencing requires volunteers and farmers to move to a central location, imposing an overhead, we have also set up an audio-conferencing facilty that enables several people to hear an expert via speaker phone. This has been introduced less than a year back, and is found to be even more popular since it can be carried by a volunteer to any village where a mobile or landline connection is available

Figure 6: Text using SMS on mobile phone and audio conferencing

RESULTS

From the pilot experiment in 2007 that covered 12 villages, we observed that the maps were indeed found useful for the rural families in drought-related decision making (Dileepkumar, 2007). In the pilot study, the outcome mapping method was used to assess the usefulness or otherwise of this information support.

In 2008 and 2009, the study covered all the 21 villages of Addakal Mandal. A field assessment of impact was designed using a blend of ethnographic action research and participatory rural communication appraisal methods (PRCA). The interactions were conducted in September-October 2008 and in Nov-Dec 2009, for evaluating the usefulness of the maps. Our projection in 2008 was that 18 out of 21 villages faced vulnerability in terms of significant surface water shortages. As of November 2008, it emerged that all the 18 villages did indeed face serious scarcity of water for agricultural production and livestock requirement. In villages marked red, crop yield losses to an extent of 60% was reported while the depletion of groundwater forced most pumps there to go dry. Specific advisories to shift to cultivation of dryland crops such as castor or pigeonpea or chickpea were not heeded generally because of the low prices such crops would fetch in the market. However, in one village, farmers cultivated only 60% of the cropping area, keeping in view the advisory and were able to avoid serious yield losses.

However in 2009 kharif season, our efforts had a positive influence, according to the surveys completed in November 2009.

Balchander Rakela, 38, is a farmer in Rachala village (population 1800). This location was forecast as a highly vulnerable location and the adjusted forecasts gave the same indication. Balchander says that he was able to tide over the severity because he had a good idea of it beforehand. He says that "ICRISAT has provided color maps and gave advice on cultivation of dry crops like groundnut, milliet, sunflower and maize. The color-coded maps provided by ICRISAT scholars proved to be a serious aid". http://www.youtube.com/watch?v=gnQGyE5AWPA

Rameswaramma, in Nijalapur village works as a volunteer with the AMS, and says "this year we had severe drought but as ICRISAT provided us with color coded maps before start of the season and also advised to plant dry land crops, I switched to millet and maize which saved my income". http://www.youtube.com/watch?v=lm2IyXeYVXQ

CONCLUSION

Drought preparedness is an accepted priority of the Disaster Management Authority of India. It can be fostered effectively using a blend of vulnerability assessment tools (in our case, derived from GIS technologies) and ODL methods. They should be integrated in a framework that uses village knowledge centers and mobile telephony.

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