Common Task-Oriented Communication Tool Applied in Radiology Department of Hospital

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Abstract. The Different roles (Registrar, technician, radiologist, IT admin), often communicate with each other through phone, face to face conversation or SMS. However, existed communication way, especially SMS didn't fully support user communication efficiently. Since most of users in radiology department have big workload, work efficiency are key points they cared about. User dislike to send communication info by manually typing message too much, also, dislike complex operation step using SMS.

Actually, at least 60% communication happened in radiology department refer to common tasks took place in radiology work flow. It lack tailored well communication tools to support different roles quick send common message and give reply ,even to deal with common tasks timely . Based on the issues, we explore to develop a quick communication tools integrated with RIS system which can meet common task-oriented communication well especially.

Keywords: Task-Oriented, Communication, Filed Observation, Hospital Roles.

1 Background

Healthcare is a complex and large-scale service system. Constituting the service system are not only medical products and medical digital products, including institution, policy, condition, social benefit, etc. Of course, human is the most critical factor in the whole healthcare service system, which includes not only patients receiving services, but also services provided by doctors, nurses and hospital staff. Therefore, the people who use services create the whole healthcare service process with the service provider. The largest challenge of the healthcare system is that people are an unpredictable factor of the service process than the controlled product. At the same time, it also provides us with the new innovation and design opportunities.

Based on Live | Work pioneered *Service Thinking*. From Product Design to Service Design, we need to change our dominant mindset.

At First, put people at the heart of service. Delivered from the individual product, the aim of our design service must be to provide valuable service to people, in a way of accepted price they desire with when they need it. Put people at the center of services system, as we need to know who they are. We need work hard to understand them and know what they need, when they need it. Then we can help them and provide them with personalized service. With this potential service opportunity for

innovation, it not only meets the users' needs, but also to create huge benefits for service provider.

Secondly, create networks that enable services. With the development of communication technology in the information age, it reflects our diverse networked societies and creates new relationships between organizations, people and things.

The third, establish sustainability as the bottom line. Service don't have the limited life span like a product. It is a continuous ongoing process, constantly changing, and then renew a cycle process. Therefore, the services need to constantly improve, and continuous recycling and sustainable development. Product provider make money from the margin on each unit of production. But services create value by meeting customer needs. Because of the important distinction, service providers must put themselves for the sake of users, and reduce unnecessary waste.

The innovation project introduced in this article, it may solve the communication problems in the human social network with health care system and reduce the people's repeated operations, to improve work efficiency around above three points.

2   Research Methods and Process Introduction

The innovation of healthcare service design needs new approach, new design tools and new technical support. In this project, we mainly used two design approach, Filed observation and Quick prototyping.

It is often said "people do not always do what they say they do" and "things are not always as they seem". We can understand the user deeply based on the observation of anthropological principles. Trying to understand user's lifestyle, behavior and attitude, focusing on the user's Journey, and their emotion in some scenarios, it finally found what really happened in the context.

Quick prototyping is a common method used in service design. The most important is to identify problems early and reduce the risk with Quick prototyping. Before the formal implementation of the idea, user can test the service system, identify problems in time and find opportunities for innovation points from the usability, visual perspective and user experience by hand-drawn sketches, scenario simulation and other methods.

3   Communication Tool's Literature Review and Existed Solution

With the development of science and technology, the way of communication and communicating tools have been constantly changing. People have experienced the most primitive period of face-to-face communication, letter, telephone, e-mail, forums, chat room, SMS, video calls, blog, social network, microblog, very popular recently, and gestures and pictures without language or words. Now there are a variety of ways to communicate, people can select the appropriate ways of communication in the context.

Julia Ashley, iCohere analysis and comparison of some of the traditional means of communication in the paper "Synchronous and Asynchronous Communication Tools".

Table 1. Synchronous Tools

Tool	Useful for	Drawbacks
Audio conferencing	Discussions and dialogue	Cost, especially when international participation is involved
Web conferencing	Sharing presentations and information	Cost, bandwidth; may also require audio conferencing to be useful
Video conferencing	In-depth discussions with higher-touch interactions	Cost, limited availability of video conferencing systems
Chat	Information sharing of low-complexity issues	Usually requires typing, "lower touch" experience
Instant messaging	Ad hoc quick communications	All users must use compatible system, usually best for 1:1 interactions
White boarding	Co-development of ideas	Cost, bandwidth; may also require audio conferencing to be useful
Application sharing	Co-development of documents	Cost, bandwidth; may also require audio conferencing to be useful

When confronted with different needs, we can mix with each other, flexible application based on the different characteristics of a variety of communication.

For the internal online chat tools, there have some innovation production now. For example, snapcomms developed **Desktop Alerts - High Cut-through**: Desk top message alerts to ensure message cut through for important employee updates. Video Desktop Alerts and RSVP Desktop Alerts **Staff Quiz Tool** Employee quiz tool. Delivered as a desktop alert or by hyperlink. Automated real time reporting. Reinforce staff learning via research links and display of answers.

And snapcomms summarizes 10 intranet tip and low cost tools for improve intranet usage with Desktop intranet Tools:

- Intranet content notifications on the desktop
- Intranet RSS - without the need for opt-in
- Promote intranet content via targeted screensavers
- Summarize intranet updates in an internal newsletter
- Remove clutter from the intranet home page
- Desktop quizzes with intranet research links
- Share the work / involve every business unit
- Easy ways to add user generated content

- Gather feedback
- Measure intranet effectiveness and continually improve

Baystate Health to Improve Employee Communication Using New Media Tools. Baystate Health's diverse workforce includes over 10,000 nurses, administrators and doctors working in hospitals, medical centers and other facilities. "The solution will allow Baystate Health to display important corporate announcements, updates and other news directly on staff's computer desktops regardless of their physical location,"explains Ray Thomas, Helpdesk Manager, Baystate Health. "We wanted to see increased visibility of effective messaging for all employees, to ensure cut-though for urgent messages, and to be better able to target messages to specific groups based upon business needs."

Baystate Health intends to use:

- Interactive Screensaver Messaging for employee communications which are strategically and operationally important but not necessarily seen as urgent by employees. These are the types of employee communications that often become buried in other internal communications channels such as email and intranet. Interactive Screensaver Messaging increases the visibility and appeal these types of internal communications and individual messages can be targeted to specific employee groups.
- Pop-up Desktop Alerts to ensure that urgent and important internal communications reach employees fast. Message targeting, recurrence and reporting features will ensure that all such messages achieve fast, effective cut-through. Delivery reporting will allow Baystate to measure and monitor message delivery and readership on a minute by minute basis.
- Scrolling Desktop Newsfeeds to deliver relevant news and information updates as scrolling newsfeeds on the computer screens of staff. Targeting options help ensure that employees only receive the information they need.

Therefore, we can recognize that if there is good communication within an organization, not only can improve the efficiency of the sector, reduce the work of staff workload and worker's mood, but also ensure the smooth operation of the service system to meet the needs of the various roles of users.

4   Filed Observation

Different from communication event happened in our daily life, communication event happened in hospital are complex and always happened based on specific tasks.

We launch a field observation at one partner site (Chao Yang hospital of Beijing) to deeply research communication scenario in radiology department.

The research focuses on below factors:

- Why need to communicate
- Who involve in communication
- When to communicate
- How user communicate with each other (specific communication behavior \ existed communication tools)
- Which issues user met during communication

Table 2. Asynchronous Tools

Tool	Useful for	Drawbacks
Discussion boards	Dialogue that takes place over a period of time	May take longer to arrive at decisions or conclusions
Web logs (Blogs)	Sharing ideas and comments	May take longer to arrive at decisions or conclusions
Messaging (e-mail)	One-to-one or one-to-many communications	May be misused as a "collaboration tool" and become overwhelming
Streaming audio	Communicating or teaching	Static and typically does not provide option to answer questions or expand on ideas
Streaming video	Communicating or teaching	Static and typically does not provide option to answer questions or expand on ideas
Narrated slideshows	Communicating or teaching	Static and typically does not provide option to answer questions or expand on ideas
"Learning objects" (Web-based training)	Teaching and training	Typically does not provide option to answer questions or expand on ideas in detail
Document libraries	Managing resources	Version control can be an issue unless check-in / check-out functionality is enabled
Databases	Managing information and knowledge	Requires clear definition and skillful administration
Web books	Teaching and training	Not dynamic and may lose interest of users
Surveys and polls	Capturing information and trends	Requires clear definition and ongoing coordination
Shared Calendars	Coordinating activities	System compatibility
Web site links	Providing resources and references	May become outdated and "broken"

5   Summary of Communication Behavior

Complex communication event happened in radiology department. Different roles communicate with each other to inform other users \ cooperatively deal with some work or share some valuable info …

The major communication types include:

- Daily Task communication (High-priority, frequently)
- Non-normal event communication -Error Control (High-Priority, seldom)
- Collaboration and sharing (Middle-Priority)
- Broadcasting & publishing (Low-Priority)

70% communication case is daily task-oriented communication. In radiology department, Registrator \technician \radiologist are respectively deal with a sub-task based on an integrated workflow. Different role communicate with each other to confirm task is on going well, etc.

Another kind of communication is taken place during "error control", error case is non-normal event, not frequently happened .Once it happened, the responsible person (always system administrator) will communicate with related roles to know the reason fully and should publish the error case to stop error become more seriously.

Except daily tasks, Radiologist should communicate to each other to share study experience and cooperate with each other to deal with scientific research.

Finally, in radiology department, it has a kinds of communication is bulletin publish of one-to-many mode. Such as, administrator or team leader publish a public message.

5.1   Key Findings

F1 Daily Task-oriented communication happened commonly in radiology department. It's most typical communication types at there.

F2 Know from our general communication behavior in life, 70%--80% messages of task-oriented communication in hospital have structured topic and content. Which at least hint us to develop a friendly and efficient message input mechanism to avoid user repeatedly input common message info.

F3 Also, different form our social communication mode, task-oriented communication in hospital always needs to track task' progress. From administrator view, he can easily know overall status through tracking work progress. From end-user view, they can ease to know whether other user check his message and have executed it or not. At least 60% case of TASK– orient communication need track solution status.

F4 It has big workload in radiology department, communication also plays an efficient role to clarify importance level & priorities of all kinds of tasks, which will push different user optimize work emphases. The factor also affects overall efficiency and clinical incident's avoidance to some extent.

4   Concept

Invention points are produced based on common task-oriented communication flow, which include below 5 points.

1. During producing task request, users (radiologist \technician\registration) can select the message from the message lib which gathers the common used message. Know from our general communication behavior in life, >60% messages of task-oriented communication in hospital have structured topic and content… The fact hint us to develop a friendly and efficient message input way to avoid user repeatedly type common message info. At here, common message lib will provide a way to support user quick produce message without need to typing manually.

   It is also flexible enough for user to easy define common message timely .For example, user can typing some message when editing info ,right-click the message to trigger the drop-down menu to select the item of "save the message into common message lib" ,then the system can save the message info the lib.

   User also can maintain their common message lib self-configuration. In default, the system will provide 3 kinds of common messages which are popularly existed in radiology department. The first type is daily task messages (such as the message of unqualified image, which are always send by a radiologist to technician), the second one is high-priority task message (ex, top priority exam for ICU patient), which are always used to remind user to deal with urgent task to avoid potential clinical incidents; the third one is common errors (ex, the message of repeated ID numbers for 2 patient), which are need to be published to remind related users. At there, they can build message type, del or add message through self-configuration.

2. In the same using scenario of producing message, if user select one exam from RIS and triggers the communication tool to produce message, the system will also auto-locate exam \patient info when user produce message. It means user doesn't need to type patient ID\ name info since the info has been auto-located based on info sync between communication tool and RIS system.

3. When user receive message, support receiver reply through "common reply list". Distinguished from daily communication behavior, when receiver captured new message in radiology department, they will give some typical reply quickly for common task-oriented communication. In most situations, if task request is clear, receiver will directly deal with tasks and give reply in easy way, they seldom spent too much time on communicating with the sender repeatedly. So we create a common reply list to support receiver give response easily when they captured message. It to some extent leads to efficiently interaction between the sender and receiver, finally improves communication productivity a lot.

4. After checking task message, the system will support user trigger the related tasks directly. Common message can always be connected to 3 kinds of data level (Fig. 1 Show the Level) .One kind of messages is related to "exam", the second kind of message is connected to "image" and the third one is" patient". When the system automatic judge which kinds of info level the message are related to, the system will help trigger the related info window in RIS or third party system directly. For example, for the common message of "need history disease info" on one patient, the system background will associate it with "patient" level, then the system will help trigger the patient related info window in RIS or third party system directly which will support user quickly deal with the tasks without any complex operation in client mode.
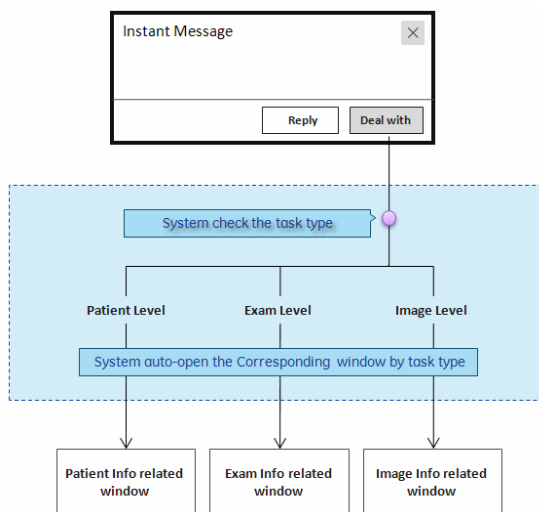
Fig. 1. 3 kinds of data level

5. Most of task message comes down to the specific user. To support user easy and quickly confirm receiver after produce message, we provide "the definition wizard of contact circle" for users in advance define his \her frequently contact person to simple contact list, also guide user build connection between receiver and specific message. Once relationship is set up between the targeted contact people and corresponding message, the message sending process will be simple totally.

When users use the message tool in first time, the system will guide user firstly to define his contacted list. In the default list, it includes all users and user groups in one radiology department, which are always be configured well by IT serviced engineer though "back office" of the system. Generally, it is a long list which affect user quickly selects the contact person. Actually, users in radiology department are always keep regular task-oriented communication with limited users (<10 users). Through self-definition, user can filter out never used contact person, only keep frequently contact person in his contact list. In next step, the system will guide user to build connection between common messages with his contact people. User can add specific message for certain people.

After the definition of contact circle, user can quick select the receiver from the list without too much operation to filter receiver every time, even can skip the step of receiver selection if the message have been connected to certain people.

7   Summary and Future Work

The system mainly has three main parts (Fig. 2 Workflow chart) :

1. Pre-configuration of common task-oriented communication link is to:

• Define **favorites** contact list in user level

- Default common message are provided in system level
- Build the connection between favorite contact person and common message

2. Quick Message sending and replying part

- Support user send message efficiently by applying common message lib.
- System auto-send message to the people who has connection with the message
- Related receiver receive message and check
- Related receiver reply message efficiently by applying common reply options

3. Deal with task…

- Support user locate related exam\image\patient info window in RIS or third party system to deal with tasks directly after user check the common message.
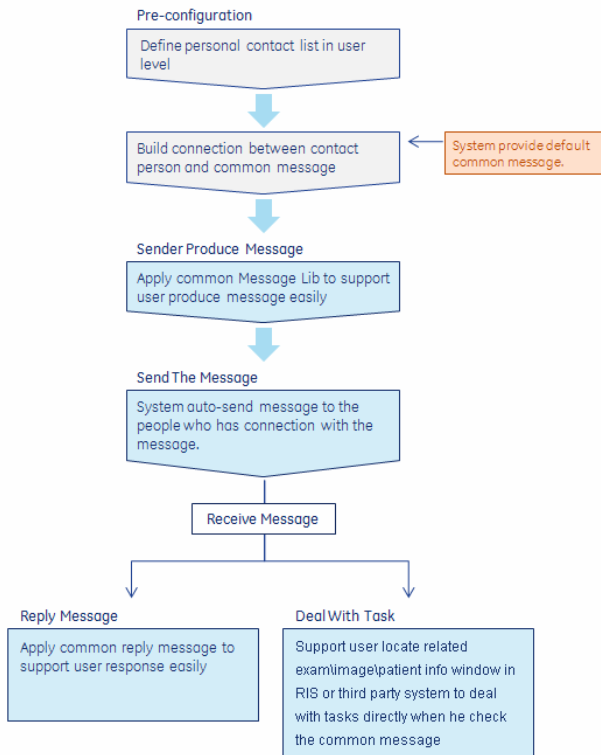

Fig. 2. Workflow Chart

Construct reasonable and run well communication network is one of the important works the design in service system. In the future, we will enhance the personalized design, extend service platform, connect with mobile devices, develop cross-platform and multi-channel communication model. This innovative project will be integrated into the whole healthcare system though the overall planning. And it will coordinate with the communication tools of the other departments and systems complement, to

better solve the problem of interpersonal communication and work efficiency. Ultimately, it will be reflected among the healthcare system, so that both patients and medical staff feel convenient, comfortable and satisfied.

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