RFI DISCUSSION FORUM

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Abstract

The construction process involves many different professionals that are in charge of making important project decisions in their own area of expertise. In many projects there will be unforeseen circumstances that arise that will require the contractor to request additional information from the professional qualified to devise a practical solution to the problem. This process of sending a request for information is commonly known as the Request for Information (RFI) process. The RFI process can occur multiple times on any given project and for many different reasons. These requests have the potential to hinder construction and, therefore, need to be resolved promptly in order to minimize the impact they could have on the flow of production. One option of expediting the RFI process time would be to create a submission process that incorporates the use of instant technology through the internet, such as the implementation of an RFI discussion forum. Having this avenue of immediate communication could have many benefits including increased project transparency, increased accountability amongst project professionals, and reduced occurrences of non-value adding activities.

Introduction

The response time of an RFI could have a huge impact on a project as inflated cycle times can affect the overall project schedule and the sequencing of downstream tasks[6]. Further complications can arise if there are additional procedures that must be followed during the RFI process or contracts that dictate the communication sequence between the professionals. Furthermore, many of the activities that are required to process an RFI are underestimated in their allotment of time, are severely unreliable, lack transparency, and include activities that do not add value to the project's main objective[5]. The goal is to seek out areas of improvement in the RFI process and to offer possible strategies to reducing the cycle time.

The RFI process must first be defined and analysed in order to find areas where improvements could be pursued. One method of analysis is to apply the principles of lean construction, presented by Lauri Koskela, such as building continuous improvement into the process, reducing the amount of steps, parts, and linkages, and increasing process transparency[4]. Once the lean construction principles are established, a plan can be devised in order to apply these principles to the RFI process in an effort to increase the process efficiency.

One method of applying the lean construction principles to the RFI process is to create a discussion forum format for RFI submittals. Having the ability to submit a project's RFIs in a discussion forum could potentially have many benefits to a project such as a reduced number of steps in the process, an increase in project transparency, and an increase in communication

amongst the professionals. This is valuable to the contractor because there should be a higher level of confidence that the RFI will reach the appropriate professional within the shortest amount of time, and the opportunity for increased communication amongst the consultants should yield to a reduced number of inconsistencies and ambiguities in the RFI responses.

In order to test the theory of the RFI discussion forum, a simulation was created. There are two scenarios to this simulation. The first scenario represents an RFI submitted on a project that has a contractual communication sequence that must be followed through the standard, web-based avenue of RFI submittals. The second scenario represents an RFI submitted in a discussion forum, which allows the information to be instantly available to all of the professionals involved and provides instant notification when a response is submitted. The results of the simulation confirm that the use of the RFI discussion forum supports the intended lean construction principles and increases the overall efficiency of the RFI process. Furthermore, these simulations can be used as tools in a classroom or office setting in order to emphasize the value of transparency and communication within the construction industry.

The RFI Discussion Forum

The RFI process was created as a communication tool in order to clarify or resolve design issues[1]. The basic function of the RFI will remain unchanged regardless of the methods used to request the necessary information. An RFI will generally be submitted by the general contractor and should contain information such as references to drawing numbers or specification paragraphs, identification of the information being requested, and the impact that this RFI will have on the project schedule. The response will be from the architect or the consultant that is responsible for that part of the design[7]. An RFI can be submitted either early on in the bidding phase or at any point during construction. If an RFI is submitted after the commencement of construction it could bring about more challenges in developing an appropriate solution. For example, any areas that have already been constructed will preferably need to be protected in place rather than altered, and any downstream tasks could have their schedules hindered. Due to the time sensitive nature of the RFI, finding and solving any issues on a project early on can help shield the other tradesmen from uncertainties and prevent costly delays[2]. The image below is a depiction of the typical RFI review process.

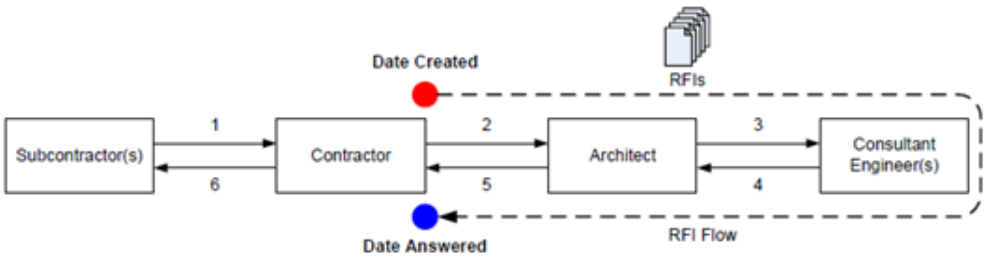

Figure 1.a: Typical RFI Review Process Flow[7]

The RFI discussion forum is a tool that can be used to help solve many of the issues that arise during the construction process. It could simplify the communication between the project decision makers and it can be applied to any project regardless of size or contract type. The discussion forum is intended to be implemented by the stakeholders early on in the development phase and should be preset with the list of professionals that will have access to the forum and who will want to receive the RFI alerts and notifications. The discussion forum

will be accessible from any internet capable device, the RFI template will have been pre-selected by the stakeholders, and the contact information for all the pertinent professionals will be pre-loaded and automatically grouped; therefore, when the contractor is ready to submit an RFI, he will simply log in to the forum, enter information being requested, and submit.

Once an RFI is submitted, the computer program will instantly send notifications, which can be received by any computer or any handheld mobile device, to every professional within the group selected. Each of these professionals will then have the ability to send correspondence containing text and/or attachments in the form of images, PDFs, spreadsheets, or CAD files. Also, the RFI would be equipped with an urgency indicator that could send additional information pertaining to the estimated completion date of the project and the impact the RFI will have on downstream trades. Reminder notifications could also be automatically generated while the RFI is still outstanding in order to encourage prompt response times, and a specific indicator could be sent out once the final response is submitted and the RFI has been closed.

The RFI Discussion Forum versus the Principles of Lean Construction

In 1992 Lauri Koskela wrote a technical paper defining lean construction and developing 11 principles that can be used as a guide to making a construction process more efficient. Lean construction is a project delivery system with the goal of meeting the client's needs while using fewer resources[3]. The 11 principles of lean construction that Koskela[4] suggests are as follows:

1. Reduce the share of non value-adding activities
2. Increase output value through systematic consideration of customer requirements
3. Reduce variability
4. Reduce cycle time
5. Simplify by minimizing the number of steps, parts and linkages
6. Increase output flexibility
7. Increase process transparency
8. Focus control on the complete process
9. Build continuous improvement into the process
10. Balance flow improvement with conversion improvement
11. Benchmark

Many of these principles can be applied to the use of the RFI discussion forum. For example, when a project converts from the traditional method of submitting RFIs to the RFI discussion forum, the RFI will no longer have to travel through a complex communication sequence which will create less emails being forwarded by individuals that are not adding any support to developing the solution. Fewer emails from superfluous individuals can also be directly correlated with reducing non-value adding activities, minimizing the number of steps, parts and linkages, and reducing variability and wasted time. Additionally, the fact that each entry can be seen by everyone on the team encourages each team member to be clear and accurate in their responses; this consequence can be directly correlated with Koskela's principle on transparency and building continuous improvement into the process. Furthermore, there will be less time wasted while an email is sent to one professional only to be delayed in the inbox of another professional, which could greatly reduce the overall cycle time of the RFI process.

And further still, the discussion forum can create the opportunity for the professionals to overcome challenges together and incorporate these best practices into the next project, which is considered by Koskela as benchmarking.

The Simulation

In order to test the efficiency of the standard RFI method versus the proposed RFI discussion forum, a simulation was developed. Simulations are powerful tools used to address diverse learning styles by engaging the learners in hand-on activities[8]. Additionally, simulations can assist in the development of teamwork, cooperation, production system design, and dependency and variation[8]. Furthermore, the simulation presented below will encourage the exploration of the potential that the proposed RFI discussion forum presents as well as any areas for improvement. Lastly, this simulation can be used to reinforce the value of clear communication, and to emphasize the effect that delays will have on each individual trade as well as the overall project.

To start this simulation there will need to be 5 or 6 team members. One team member plays the role of the trade foreman, one team member is the superintendent, one is the architect, one is the project construction manager, one is the inspector, and one is the structural engineer. During the test run of this simulation the following parts were used: a building platform with a north arrow, 8 Legos, 6 pencils, a stop watch, blank paper, step by step photos of 2 different structures, and 2 sets of written instructions on how to build each structure. There are 2 phases to this simulation: scenario 1 and scenario 2. In each scenario the set of written instructions is provided to the contractor who is tasked with building the structure from the Legos. The instructions are written in a manner as to elicit questions from the foreman in order to simulate the RFI process. Only the structural engineer will have access to the step by step photos of the structure being built. The contractor will not be able to proceed to the next step in the instructions until he obtains the necessary information from the structural engineer. These scenarios are meant to mimic a typical design-bid-built communication sequence; the first scenario represents the standard RFI process while the second scenario represents the method of the RFI discussion forum

In the first scenario that is played, the trade foreman will be given the set of instructions for structure number 1. The foreman is responsible for building the structure completely and correctly, as it will be inspected by the inspector at the end of the simulation. The players are instructed that no verbal communication is to take place, only written, simulating communication through computerized email messages. There are 7 very vague, non-detailed instructions for the construction of structure 1 that is given to the foreman. The step-by-step visual images are given to the structural engineer. Once the timer is started, the foreman will begin to build the structure. When the foreman is faced with an instruction that is unclear, he must prepare and send a mock RFI to the superintendent. To do this, the foreman must create a simulated email by writing out the request for information on the paper provided and then send it (or hand it) to the superintendent. After the superintendent examines the validity of the mock RFI, he will either forward the email to the project construction manager or send it back to the foreman for additional details. The construction manager will perform the same type of review to the mock RFI and will respond in a similar manner, either by sending the question back for additional details, or by forwarding it to the architect. The same procedure

will be followed by the architect who will also review the question and forward it to the structural engineer. Once the structural engineer has the RFI, he will have to look at the photos made available to him and come up with either a solution to the question or another question to clarify what the foreman is asking. The solution can be in the form of written instructions or hand drawn schematics. The structural engineer will then send the response back through the communication chain until it reaches the foreman. The foreman will then need to decide if there is enough information to resolve the problem or if further information needs to be requested. If that step of the instructions can be completed, the foreman will move on to the next step and continue the process as before.

The instructions for structure 1 are as follows:

1. Lay the building platform on the table with the north arrow pointing up
2. Lay the light grey Lego piece flat on the platform
3. Lay the 2 purple pieces on either side of the light grey piece
4. Place the grey piece across all 3 existing pieces
5. Place the long black piece at the end, connecting the purple pieces
6. Place the black L-shaped piece on top of the long black piece
7. Place both triangle pieces on either side of the dark grey piece

Once the structure is complete, the timer will stop and the inspector will examine the structure, comparing it to the visual images provided. The structure that is to be built can be seen in the figure below.

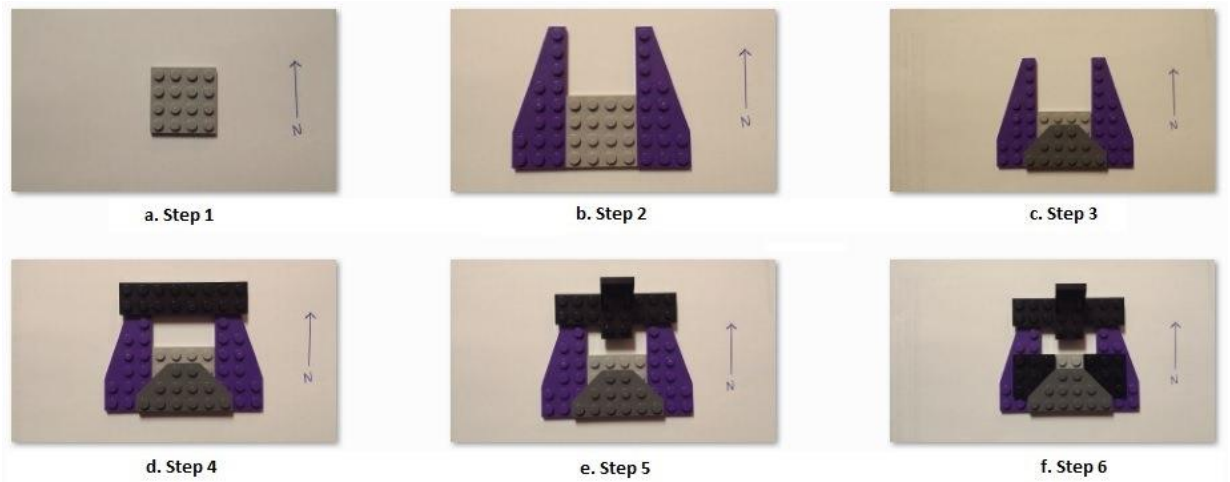

Figure 2.a-f - Scenario 1 - Visual Building Instructions

In the second scenario, the foreman will be given a set of instructions to build structure number 2. As before, the foreman is responsible for building the structure completely and correctly, as it will be inspected at the end of the simulation. The players are instructed that no verbal communication is to take place, only written, simulating communication through discussion forum messaging. Structure number 2 is proposed using the same 8 Legos but with a different set of instructions that are, again, written in a manner as to elicit questions from the foreman. The structural engineer will be given the visual images in order to respond to the mock RFIs that will be sent from the foreman.

Once the timer has started the foreman will begin building the structure. As in scenario 1, the foreman will immediately need further information before he is able to complete the

construction of the structure. In this scenario, once the foreman writes out the question it is placed face-up in the middle of the table, making the mock RFI immediately accessible to everyone else on the team. At that point, anyone with a question, comment or concern is able to respond, in writing, to the foreman's initial question. Any response to the mock RFI is also placed face-up in the middle of the table, making it immediately accessible to the other team members. The project construction manager is advised to oversee the comment responses being made and to encourage certain teammates to contribute their ideas. If the structural engineer responds to the mock RFI, even if it's with additional clarification questions, the foreman will be able to see these questions right away and should be able to respond quickly, either with additional questions or by closing the RFI. To simulate the RFI discussion being closed the foreman will remove the pile of responses from the center of the table and set them aside. Once the foreman has enough information to complete that step in the list of instructions and that mock RFI is closed (set aside), the foreman will move on to the next step in the instructions.

The instructions for structure 2 are as follows:

1. Lay the building platform on the table with the north arrow pointing up
2. Lay the long black piece flat on the platform
3. Place the triangle pieces at either end
4. Place the tips of both purple pieces under the triangle pieces
5. Place the black L-shaped piece on top of the long black piece
6. Place the light grey piece on tip of the chair piece
7. Place the dark grey piece under the light grey piece

Once the structure is complete, the timer will stop and the inspector will examine the structure, comparing it to the visual images provided. The structure that is to be built can be seen in the figure below. Each of the team members is requested to compare and contrast the 2 scenarios and discuss what could be learned from each.

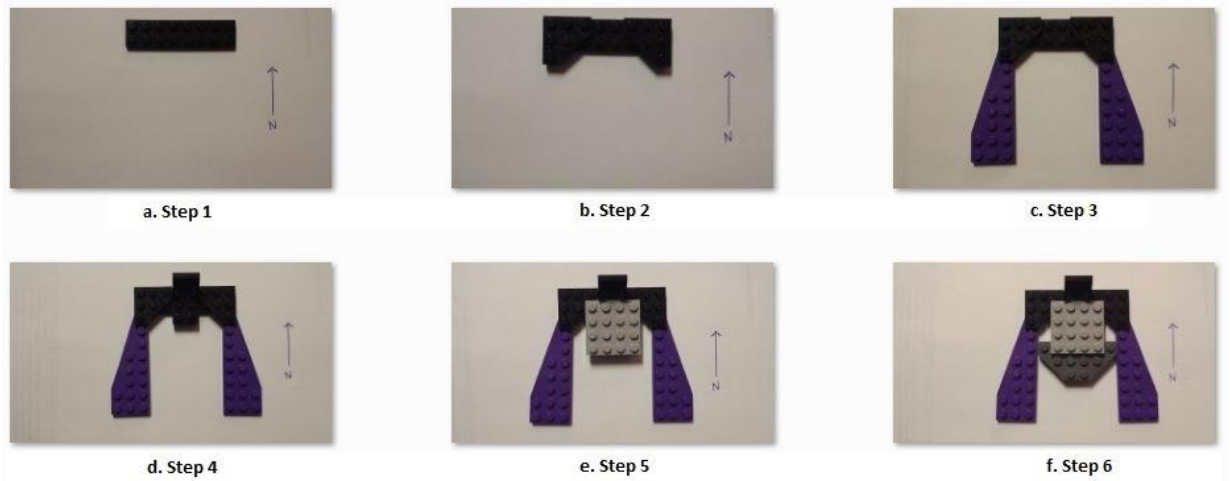

Figure 3.a-f - Scenario 2 – Visual Building Instructions

Results

While testing this simulation, each scenario was played out using the same 5 people. In the first scenario the structure was built correctly and completely in 27 minutes and 35 seconds.

The second scenario was built correctly and completely in 15 minutes and 49 seconds. This data suggests that the RFI discussion forum could be 42% faster than the traditional methods.

There will be a few variations, obviously, between this simulation and the actual RFI process. First, any program that is made with the intention of solving issues for the user is only as good as the operator of that program. In other words, if the team members of the project are not on board with the idea of using this tool as it is meant to be used then the efficiency issue within that project cannot be rectified. Also, the structures actually being built will come with a set of detailed schematic drawings that will be numerous pages thick, which will add more complexity to the process. Furthermore, there could be many more stakeholders or decision makers involved on a project, which could add increased variability and complexity to the process. However, this simulation confirms that the RFI discussion forum does support many of Koskela's principles of lean construction such as reduced non-value adding activities, reduced cycle times, and increased transparency.

Additionally, this simulation could be used as a great learning tool. Students and professionals that complete this simulation should be able to better appreciate the value of clear and direct communication as well as enhance coordination techniques in order to produce the desired result in the most efficient manner.

Conclusion

The RFI process plays a huge role in the construction industry. Everyday RFIs are submitted, and many construction teams have felt the strain that an outstanding RFI can have on a project and its schedule. For these reasons and more, it is imperative that the RFI process flows as smoothly and efficiently as possible. Fortunately, there are a few simple strategies that construction management teams can follow in order to help ensure that any impending RFIs will be taken care of effectively and promptly. Reducing the number of people that the RFI has to pass through, making the information as clear and concise and transparent as possible, and opening up the flow communication are but a few options available to try to reduce the RFI cycle time. As seen in the information provided, the proposed RFI discussion forum employs all of these strategies. This forum could change the pace of the construction industry and enhance the communication and coordination skills amongst the professionals.

Bibliography

1. Claims Avoidance & Resolution Committee. (2008). "Best Practices on Construction Projects: Project Management Procedures Request for Information." Construction Institute Claims Avoidance and Resolution Committee. American Society of Civil Engineers. http://content.asce.org/files/pdf/RFIs.pdf
2. Howell, G., and Ballard, G. (1998) "Shielding Production: An Essential Step in Production Control." *J. Constr. Eng. and Mgmt.*, ASCE, New York, NY, 124 (1) 11-17.
3. Howell, G., Laufer, A., and Ballard, G. (1993). "Interaction between Subcycles: One Key to Improved Methods." *J. Constr. Engrg. and Mgmt.*, ASCE, New York, NY, 119 (4) 714-728.
4. Koskela, Lauri (1992) "Application of the New Production Philosophy." CIFE Technical Report. Stanford University

5. Pestana, A, Alves, T., and Barbosa, A. (2014). "Application of Lean Construction Concepts to Manage the Submittal in AEC Projects." *J. Manage. Eng. 30(4), 05014006.*
6. S. Mohamed, P.A. Tilley, S.N. Tucker. "Quantifying the Time and Cost Associated with the Request for Information (RFI) Process in Construction." Acadamia.edu. http://www.academia.edu/3580760/quantifying_the_time_and_cost_associated_with_the_request_for_information_rfi_process_in_construction.
7. Chin, Chang-Sun (2010). "RFI Responsiveness of Paper-Based vs. Web-Based Information Processing Systems." Proceedings IGLC-18, Technion, Haifa, Isreal
8. Tsao, Cynthia C.Y., John Draper, Gregory Howell. (2014). "An Overview, Analysis, and Facilitation tips for Simulations that Support and Simulate Pull Planning" Proceedings IGLC-22, June 2014, Oslo, Norway