

Keithly Barber Associates +
Toombs & Associates Engineering

**Commissioning School Projects, What's Working, What's Not
Lessons Learned in the Pacific Northwest
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Synopsis

Over the past 20 years, Building Commissioning (Cx) has been increasingly applied as a quality assurance process to the construction of many public schools. Today it is common practice in many areas, and a code requirement in others. In Washington State for example, all buildings must be commissioned in order to comply with the state Energy Code, and since 2001, commissioning of school projects has been a requirement as part of a package that also mandates value engineering and constructability reviews. Now that numerous schools have been commissioned, and with commissioning in many areas commonplace, it is a good time to survey the various stake-holders regarding school commissioning's value and effectiveness. This paper reports on the results of such a survey and suggests ways in which we might improve our approach to school project commissioning.

About the Authors

Kent Barber is the Managing Principal of Keithly Barber Associates (KBA), a commissioning services firm based in Tukwila, WA. Kent has been a commissioning services provider since 1992, and is a founding member of the Building Commissioning Association. Approximately one third of KBA's projects are educational facilities.

Pete Keithly is the founder of Keithly Barber Associates, the former 9-year O&M Director for the South Kitsap School District, and a founding member of the Building Commissioning Association. Pete began providing commissioning services in 1996 and currently, in semi-retirement, provides commissioning consulting services as the Managing Principal of Team Commissioning.

Jeremy Fugere has over 25 years of experience installing, operating and commissioning building systems. He has been a specialized commissioning services provider since 1995 and has commissioned approximately 60 educational facilities.

Sarah Stewart graduated from the University of Kent (Canterbury, U.K.) in 2009 with a BSc in Psychology. In 2014 she relocated to the U.S. as a marketing team member for a large, international personal care appliance manufacturer. She joined the KBA team in 2015.

Introduction

As long-time commissioning service providers for educational facilities, answering the question, "Commissioning School Projects, What's Working, What's Not", is particularly relevant to us. We love and strongly believe in the value of what we do, so after a couple of decades of educational facilities commissioning, it seemed important to ask the question. We believed that addressing the question would not only provide us with information that

allows us to hone our craft, but that it would provide information that improves the value of commissioning for the entire educational facilities sector. In order to obtain a reasonably valid answer to the question, it seemed critical for us to solicit answers from commissioning stake holders of all types: school owners, operators, designers, builders and other commissioning professionals. So that's what we did.

The Survey in Summary

We chose a survey as our tool to solicit answers from a full spectrum of commissioning (Cx) stake holders. We sent survey invitations to approximately 1,000 members of the Association for Learning Environments (A4LE), working in the Northwestern US and Western Canada, the Washington Association of Maintenance and Operations Administrators (WAMOA), and the Northwest Chapter of the Building Commissioning Association (BCA). We asked 24 questions, 3 of which were designed to determine respondents' background related to Cx. Eight (8) questions focused on positive or negative impacts of commissioning on project delivery overall, as well as during various project phases; another 10 explored the participation and interaction of various project team members in the commissioning process; 2 asked about when commissioning should start and who should lead the process; and a final question invited respondents to, "provide any specific comments and/or suggestions regarding your perspective on the formal building commissioning process below, especially regarding how it could improve." Each of the survey questions and associated response data appear in an appendix at the end of this document.

We got 86 total responses from 32 Owner's and Owner's Representatives, 8 Facility O&M (FO&M) related managers, 3 Project Management (PM) Consultants, 11 Architects, 6 Engineers, 3 Contractors, 4 Equipment Suppliers, and 19 Independent Commissioning Services Providers (CxPs), also known as Commissioning Authorities or Agents. Discussions on the success and value of commissioning overall, and by project phase, appear further in this paper. However, general concepts expressed by the survey data taken as a whole may be summarized as follows:

1. A strong majority of respondents believe that commissioning has a positive impact on delivery of the building, enhancing the design and construction phases.
2. A strong majority of respondents, especially owners' operating staff, believe that commissioning, at least for the most part, facilitates effective turnover, reduces warranty issues and saves on operating costs.
3. The data and comments generally indicate that commissioning has gotten more effective over the years, but that there is still plenty of room for improvement.
4. Survey data indicates that design and construction teams are collaborative commissioning participants more often than not, but that this is an area that could be improved. Comments tend to indicate that many believe that the more commissioning is an integrated part of the delivery process, and the more collaborative the team, the more effective commissioning tends to be.
5. Most respondents indicated the importance of documenting the OPR before design begins.
6. Most respondents indicated that the CxA should join the team at DD or earlier.
7. Most respondents indicated the importance of clearly specifying commissioning in design and construction contracts, though many commented on this being an area that could stand improvement.
8. Respondent suggestions regarding commissioning seem to trend towards starting commissioning early in the project process, integrating it into the overall delivery process, and approaching it in a collaborative manner.

Success and Value of Commissioning

Most survey respondents clearly believe commissioning has a positive impact on project delivery. The overall and phase by phase results are summarized in the following paragraphs:

Overall

Building commissioning appears to be valued by a significant majority of respondents. Eighty percent (80%) of respondents (to Question 4) said that they believe that Commissioning has had a positive impact on building delivery. About 10% said its impact has been negative, while approximately another 10% said commissioning hasn't had any impact, or they didn't know what impact it's had. It seems noteworthy, that none of the FO&M Managers, PM Consultants or Contractors responded that commissioning had a "Negative Impact", or even "No Impact," though a few FO&M and Contractor respondents said they didn't know what impact it had. Not surprisingly, 100% of commissioning providers (CxPs) responded that commissioning has a positive impact.

During Design Phase

Just over 76% of respondents said (responding to Question 11) that commissioning during design enhances the project, while less than 3% said commissioning disrupts the project during design. Close to 7% said commissioning during design makes no difference, and less than 12% said they don't know. Significantly, about 70% of the responding design professionals (Architects and Engineers) said that design phase commissioning is an enhancement. Once again, the FO&M staff were commissioning fans: 80% said commissioning enhances design, 20% said it made no difference, but none said it was disruptive or that they didn't know.

During Construction Phase

When asked a similar question (#16) about commissioning during construction, over 91% of respondents said commissioning during construction "enhances the project". Owners, PM Consultants, Architects and Engineers and CxPs were unanimous in declaring that Construction phase commissioning "enhances the project". The product suppliers said they didn't know. The FO&M responses to this question were interesting, given their responses to most questions strongly favored commissioning, typically by 80% or more. In this case however, only 60% of FO&M respondents (still a majority) said commissioning enhanced the construction project; however, 20% said commissioning disrupted it, and 20% said they didn't know. This appears to be consistent with the FO&M response to question 19 (discussed further along in this paper), where 40% said that commissioning is not completed in a reasonable amount of time. One might wonder if these respondents see a tradeoff between what they see as disrupting construction if the end result is a better product, as indicated by FO&M responses on questions 21, 22 and 23 (in the next paragraph).

Facilitating Turnover (from builders to owners' operators)

Questions 21, 22 and 23 asked if commissioning improves the efficiency and effectiveness of building turnover, saves operating costs, and reduces warranty issues. Just over three quarters of all respondents said commissioning improves turnover and reduces warranty issues, and about 81% said operating costs are reduced. FO&M responses were especially favorable regarding these questions, with 100% saying commissioning improves turnover and reduces warranty issues, at least for the most part. Eighty percent (80%) said commissioning saves operating costs, at least for the most part. Owners' Commissioning

Representatives also felt strongly about commissioning benefitting turnover, though slightly less so than FO&M respondents. Just under 86% of Owners' Commissioning Representatives said it improves the efficiency and effectiveness of building turnover, at least for the most part; two thirds of them said operating costs are reduced, and just over 57% said warranty issues are reduced.

On the question of improving the efficiency and effectiveness of building turnover, 2 of 3 contractors said yes, or at least for the most part, while 1 said no. Similarly, 2 of 3 said commissioning reduces warranty issues and saves operating costs, while 1 said they didn't know about either. The 2 PM consultants were split 1 yes, 1 no on improving turnover and reducing warranty issues, though both said operating costs were reduced, at least for the most part.

The opinions expressed by Architects and Engineers differed from each other. Engineers responded 80% yes, 20% no, on all three matters; improving the efficiency and effectiveness of building turnover, saving operating costs, and reducing warranty issues. Architects, on the other hand were split roughly 43% yes, at least for the most part, and 43% no, on improving turnover; just over 71% yes, at least for the most part on saving operating cost, the remainder saying they don't know; and about 43% saying commissioning reduces warranty issues, while the remainder said they don't know.

Closeout

Questions 18 and 19 speak to commissioning project closeout efficiency. They are, respectively, "In your experience, are the issues discovered during commissioning generally resolved, or are a significant number of them left unresolved at the close of a typical project?" and, "In your experience, is the commissioning process typically completed in a reasonable amount of time?" Approximately 87% of all respondents said most issues are typically resolved. There was close agreement among Owner's Commissioning Representatives at 91%, FO&M Managers, PM Consultants and Architects at 100% and CxPs at 95%. Engineers still reported positively, if slightly less so, with 80% reporting most issues resolved while 20% reporting many unresolved. Among the 3 Contractors, 2 reported most issues resolved, while 1 said many issues remain unresolved.

Approximately 81% of all respondents said commissioning is completed in a reasonable amount of time, at least for the most part. By discipline, statements that commissioning is completed in a reasonable amount of time, at least for the most part, came from approximately 82% of Owner's Commissioning Representatives, 100% of PM Consultants and Contractors, 86% of Architects, 80% of Engineers, and 83% of CxPs. FO&M responses varied significantly from the other disciplines, with only 60% saying commissioning is completed in a reasonable amount of time, and 40% saying it isn't. This appears to be consistent with the previously noted strong (20%) FO&M response that commissioning disrupts construction. In spite of their feelings about slow prolonged closeout and time, FO&M responses to questions regarding building turnover and post construction performances (Questions 21, 22 and 23) indicate satisfaction with the final product. As previously discussed, 100% of FO&M respondents said commissioning improves turnover and reduces warranty issues and 80% said commissioning saves operating costs.

Summary

Overall, survey respondents indicated a favorable impact of commissioning on all phases of the project. However, FO&M respondents, seemed to suggest that while commissioning facilitates building turnover and performance, from their perspective at least, closeout can take too long.

Who Should Lead the Process and When Should They Start

Respondents were asked who the leader of the commissioning process should be (question 17), and when that individual should join the project team (Question 5). The question of who should lead the commissioning process was asked as follows: "Who do you feel is the most appropriate choice for developing and leading the commissioning process?" It was possible for respondents to select more than one answer. As a result, when the percentage of respondents answering all of the answers are summed, the total exceeds 100%, and is in fact 155%. Approximately 82% of all respondents chose an independent CxP, 35% an owner's employee with commissioning training, 23% a design team member with commissioning training, and 14% a contractor's representative with commissioning training.

Significant exceptions from the overall trend were: All the PM Consultants and Contractor respondents preferred an independent CxP. Eighty percent (80%) of FO&M responses identified both CxPs and owner's employees with commissioning training as being appropriate, 20% also said a contractor's representative with commissioning training, but none of the FO&M respondents indicated that design team members are appropriate. Interestingly, like the FO&M respondents, none of the Engineers indicated that design team members are appropriate commissioning leaders. Engineers responded 40% CxPs, 60% owner's employees with commissioning training, and 20% contractors' representatives with commissioning training. It is also noteworthy that none of the 3 Contractors indicated that it's appropriate for the Cx leader to be a contractor's representative with commissioning training.

When asked, "When should the CxA (leader join the project team," answers were wide spread between disciplines, and somewhat confusing because it was possible for respondents to select more than one answer. However, the clear majority (85%) said the CxA should join the team at Design Development Phase or earlier. Over 30% of overall respondents, and Owner's Commissioning Representatives specifically, indicated that Pre-design phase is an appropriate time to get the CxA on board.

To summarize, most respondents from all disciplines believe that an independent CxP is the appropriate person to lead the commissioning process, and that this individual should join the project team at design development or earlier. Many respondents (35%), other than contractors, indicated that an owner's employee with commissioning training could also be a good commissioning leader, and some respondents (23%) other than engineers and contractors indicated that a design team member with commissioning training could do the job.

Acceptance and Integration of Commissioning Into Overall Project Delivery

Approximately 40% of the survey questions explored the participation and interaction of various project team members in the commissioning process. The response to these questions shed light on how well commissioning is accepted by various project team members, and on how well it is being integrated into the overall project delivery process.

Communicating the Owner's Project Requirements (OPR)

Three questions were asked regarding the OPR: "In your experience, are the Owner's commissioning expectations and project functional requirements clearly defined and communicated to the CxA and project team?" , "In your opinion, how important is it to develop an OPR document to clearly define the specific desired construction and performance requirements for the project prior to the start of design work?" and , "On projects you have participated in where a formal commissioning process has been followed, is an OPR document typically produced prior to the start of the design work?"

Interestingly, approximately 73% of Owner's Commissioning Representatives, 100% of FO&M Managers, and 72% of CxPs said they think it's critical to develop an OPR document prior to the start of design, however, only 29% of Architects and 33% of engineers agree. Most Architects and Engineers think an OPR document

is helpful, but not critical. Yet respondents of all disciplines, including Architects and Engineers, reported that only sometimes are "Owner's commissioning expectations and project functional requirements clearly defined and communicated to the CxA and project team." Further, regardless of the Owner and FO&M preferences for formal OPR documents, the majority of respondents of all disciplines reported they only see formal OPRs on their projects occasionally, which appears to be consistent with reporting the projects only sometimes have clearly communicated owner requirements.

Design Team Integration and Acceptance

Questions 9 and 10 asked: "In your experience, do design teams do a good job of supporting and participating in Cx?" and "In your experience, do the design team contracts adequately support their commissioning roles and responsibilities?" Respondents were asked to answer "Yes," "Sometimes," "No", or "I don't know". Of the disciplines commonly involved in the design phase, most said sometimes. About 80% of Owner's Commissioning Representatives were divided between Yes and Sometimes, while the remainder said No. PM consultants were split 50%/50%, Architects 43%/57%, and CxPs 22%/72% between Yes and Sometimes. None of the FO&M and Engineer respondents said Yes. FO&M responses were 80% Sometimes and 20% No, while engineers were 100% Sometimes. Clearly all disciplines see room for improving commissioning team dynamics during design phase, with Engineers and FO&M Managers seeing the greatest need for improvement.

When asked whether or not design team contracts support commissioning, the consensus among those likely to be privy to the content of design consultant contracts was "Sometimes," with this response discipline being: 55% Owner's Commissioning Representatives, 60% FO&M, 100% PM Consultants, 86% Architects and one third of Engineers. "Yes" responses were: 36% Owner's Commissioning Representatives, 20% FO&M, 0% PM Consultants, 7% (estimated) Architects and one sixth Engineers. "No" responses were similar to "Yes" responses, at 9% Owner's Commissioning Representatives, 20% FO&M, 0% PM Consultants, 7% (estimated) Architects and one sixth Engineers. From the responses to these 2 questions, it appears that more focus on commissioning support might be needed in a significant percentage of design consultant contracts.

In summary, the survey responses indicate that respondents from design phase disciplines appear to see room for improving design phase commissioning dynamics and supporting consultant contracts, with Engineers and FO&M Managers seeing the greatest need for improvement.

Construction Phase Integration and Acceptance

Questions 12, 13, and 14 were about commissioning specifications: "In your experience, are commissioning requirements and processes adequately specified in the contract documents"; "are the commissioning specifications understood by the construction team"; and "are commissioning specifications enforced?" Response options were "Yes," "Sometimes," "No," and "I don't know." To the question of adequate commissioning specifications, half or more (50% to 60%) of Owners' Representatives, FO&M Managers and Project Management Consultants said "Yes." However, the responses of disciplines living with the commissioning specs on a day to day basis were less positive, with a "Yes" response from only 14% of Architects, 33% of Engineers and Contractors, and 11% of CxPs. When the responses of "Yes" and "Sometimes" are combined, the range for all these respondents jumped to 80% to 100%. Interestingly, the 2 Product Supplier responses were split between "No" and "I don't know." While it's hard to extrapolate too much from 2 responses, it might be advisable for commissioning spec writers to see how well they specify product supplier participation.

For the most part, responses to the questions of whether or not commissioning specs are understood and enforced showed a similar trend. For both questions, about 85% of respondents said at least sometimes ("Yes" and "Sometimes" responses combined). However, "Yes" only responses dropped significantly to 17% for the construction team understanding the commissioning specifications and 34% for commissioning specifications enforcement. The very significant deviation from the overall trend is that none of the 2 PM Consultants, 3 Contractors or 2 Product Suppliers answered "Yes" to the question of commissioning specification being understood by the construction team; though both of the responding PM Consultants and 2 of the 3 of the contractors answered "Sometimes."

Question 15 asked, "In your experience, does the construction team collaboratively participate in the commissioning process?" The responses to this question were, perhaps not surprisingly, consistent with the responses on commissioning specifications. Few respondents (about 29% overall) said "Yes," but combined "Yes" and "Sometimes" responses show that most respondents in all disciplines agree that collaborative participation occurs at least sometimes.

In summary, the survey responses appear to send a clear message that as an industry, we can do a better job of integrating commissioning into the project specifications and dynamics of the construction team.

Integration of FO&M into the Commissioning Process

Question 20 asks, "In your experience, are the Owner's Maintenance and Operations related staff adequately integrated into the commissioning process?" Many "built environment" stakeholders consider involving the building operators in the project delivery and commissioning processes critical to maintaining building performance on a long-term basis. Interestingly, 73% of Owner's Commissioning Representatives say, "Yes" or "For the most part," (O&M staff are included) while 80% of the FO&M Managers' responses were "No." A clear difference of opinion seems to exist between Owner's planning and construction people and their building operators. Other disciplines tended to agree with the FO&M Managers. "No" responses from other disciplines were: PM consultants at 100%, and Architects, Engineers and CxPs all around 60%, supporting the FO&M managers' view that O&M staff need more involvement.

Respondent Suggestions for Improvement

The final question asked in our survey was, "Please provide any specific comments and/or suggestions regarding your perspective on the formal building commissioning process below, especially regarding how it could improve." We got 50 responses, which appear in the Appendix. The 2 most common themes among these comments were: 1) the importance of Owner involvement and support, including O&M staff, in the success of the commissioning, and 2) the value of a collaborative approach to commissioning. There were also some comments about the value of the OPR. It is also noteworthy that though this survey neglected to include questions about integrating commissioning into the construction schedule, there were 4 comments suggesting the importance of Cx/construction schedule integration and management.

What's Working and What Do We Need to Improve? Some Takeaways

This survey's respondents almost overwhelmingly seem to believe that commissioning helps deliver better school buildings, however, their responses suggest that the application of the process can be improved in several ways, presumably to have an even more positive impact. To us, the survey data suggested the following significant takeaways for improving Cx.

Owner's – consider the following:

- Owner involvement in commissioning is important at the project management and O&M levels.

- Participation of your O&M staff can add commissioning value during both the design and construction phases.
- Include your Commissioning Authority/Leader in the project team early enough to integrate commissioning into the delivery process culture, promote collaboration, and where appropriate, help document commissioning expectations and project functional requirements for the team prior to design.
- It is important to make it clear to your designers and project managers that you expect the commissioning process to be fully supported by their contracts.
- It is important to make it clear to the design team that you place a high value on commissioning and will support enforcement of the commissioning specifications.

Design Team – consider the following:

- Confirm that you understand the Owner's commissioning expectations and project functional requirements, and that your contract supports your commissioning participation. Raise related issues at project's onset.
- Communicate with the Commissioning Authority early and often. Collaborate and make the commissioning process work for everyone.

Construction Team – consider the following:

- Confirm that specified commissioning requirements are understood and carried out all the way through building turnover and the warranty period. Raise related issues at project's onset.
- Integrate the commissioning schedule into the construction schedule and address commissioning scheduling issues head on and realistically.
- Collaborate with the Commissioning Authority early and often, and make the commissioning process work for everyone.

Commissioning Providers – consider the following:

- Confirm that you understand the Owner's commissioning expectations and that your contract is consistent with those expectations.
- Confirm that commissioning is clearly and completely integrated into the construction specifications without meaningless extraneous boilerplate. Confirm that specifications are enforceable and enforced.
- Collaborate with the project team early and often.
- Support participation of, and collaborate with, the Owner's O&M staff.

Appendix, Survey Questions

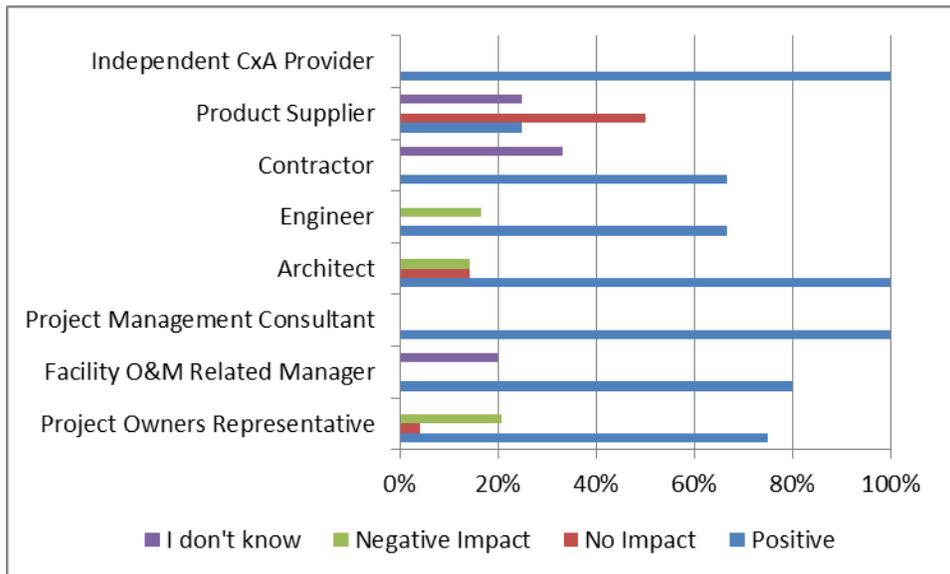
The survey consisted of the following questions presented here with summarized responses.

1. Have you participated in at least one project where at least one building system was formally commissioned in a K-12 school?
 - Yes: 92% of respondents
 - No: 7% of respondents – not included as respondents to remaining questions.

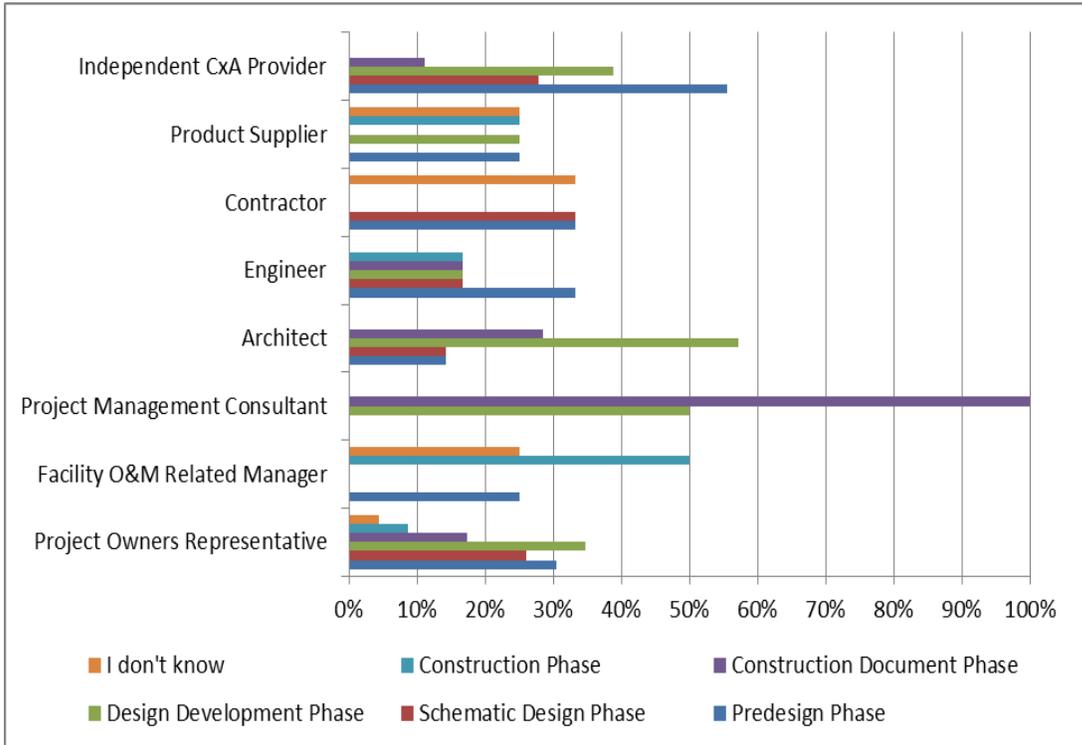
2. Where are you located?
 - Canada: 12% of respondents
 - U.S: 88% of respondents

3. What is your typical role on building projects?
 - Project Owner's Representative (Employee of the Project Owner): 30% of respondents
 - Facility O&M Related Manager: 8% of respondents
 - Project Management Consultant: 2% of respondents
 - Architect: 10% of respondents
 - Engineer: 7% of respondents
 - Contractor: 3% of respondents
 - Product Supplier: 5% of respondents
 - Independent Commissioning Services Provider: 22% of respondents
 - Other (please specify): 13% of respondents

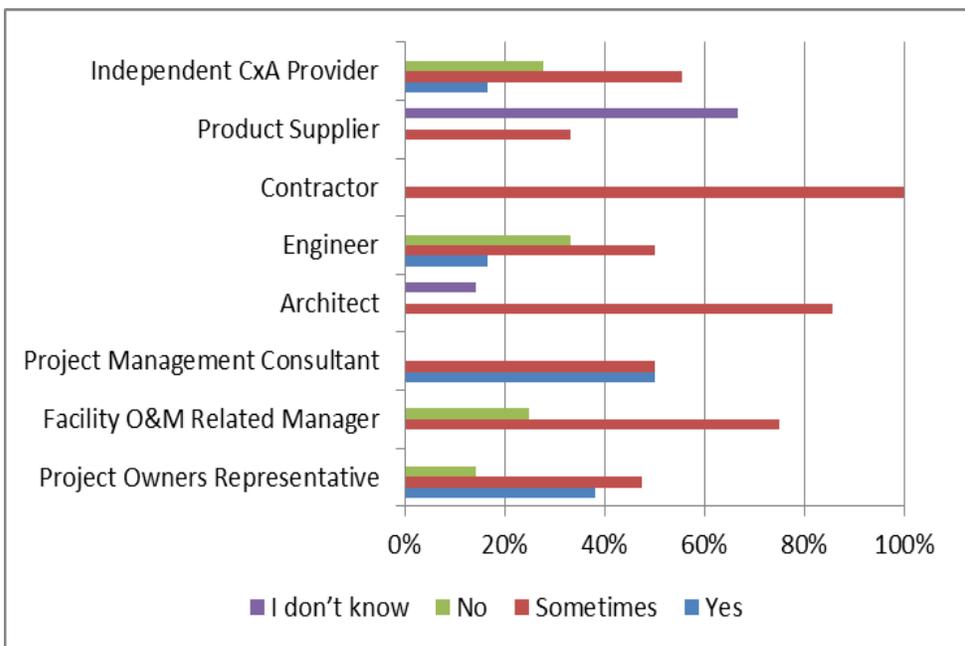
4. In your experience, what impact has the commissioning process had on the delivery of buildings?



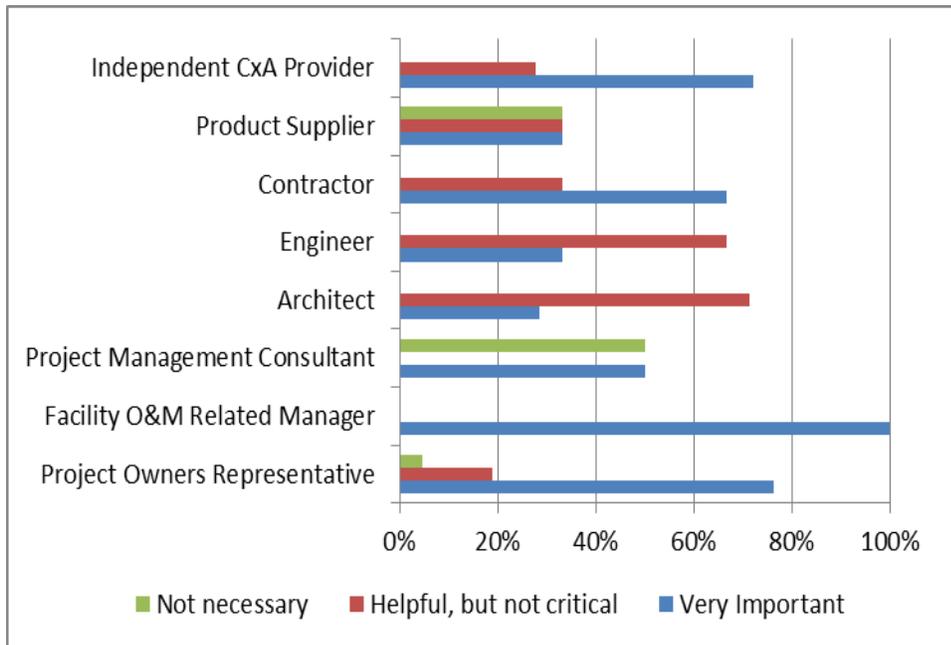
5. For best results, the CxA should join the project team during;



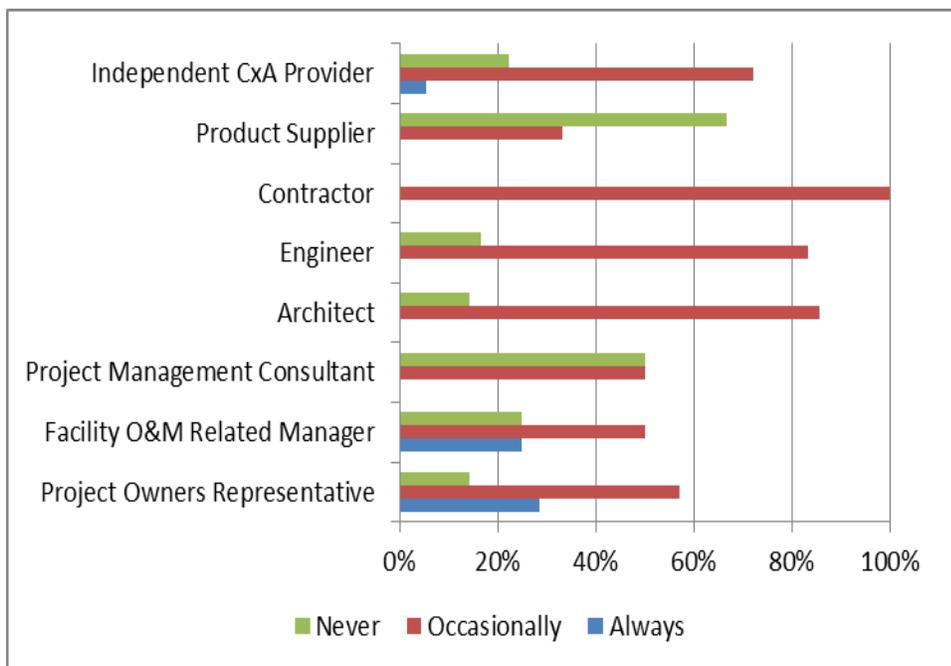
6. In your experience, are the Owner's commissioning expectations and project functional requirements clearly defined and communicated to the CxA and project team?



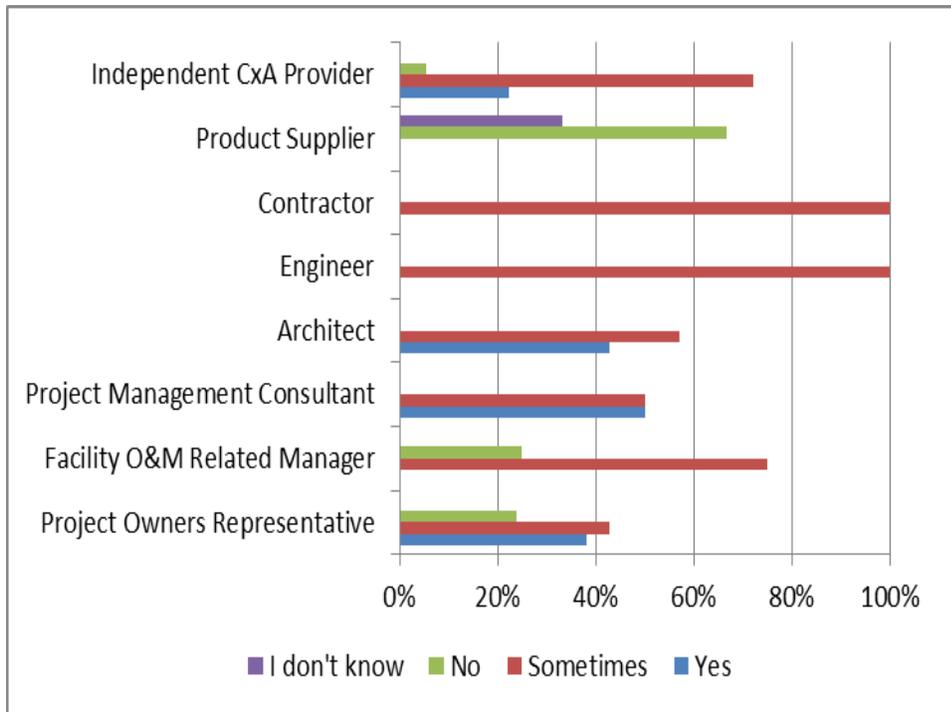
7. In your opinion, how important is it to develop an OPR document to clearly define the specific desired construction and performance requirements for the project prior to the start of design work?



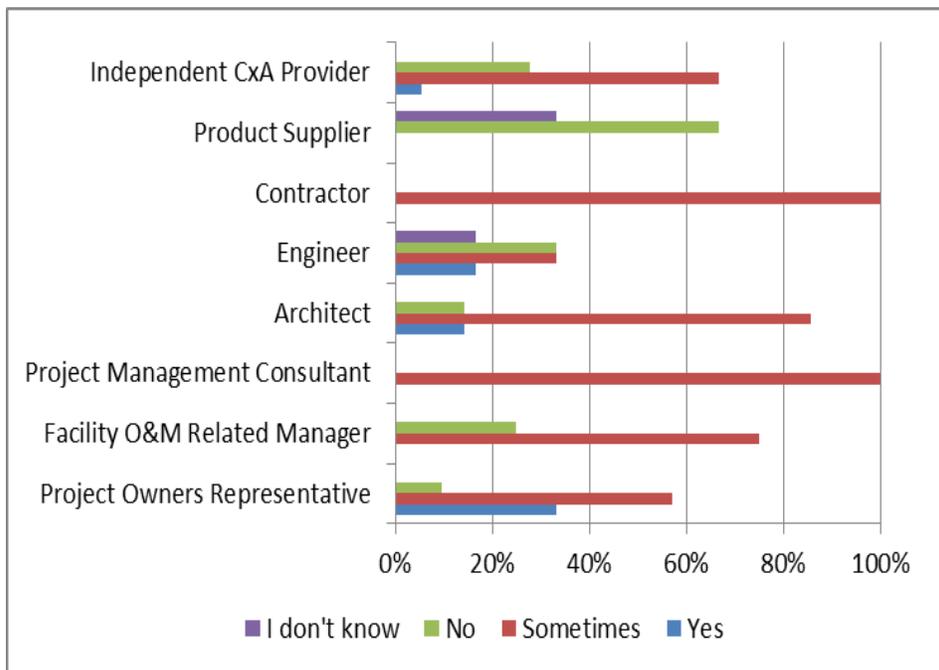
8. On projects you have participated in where a formal commissioning process has been followed, is an OPR document typically produced prior to the start of the design work?



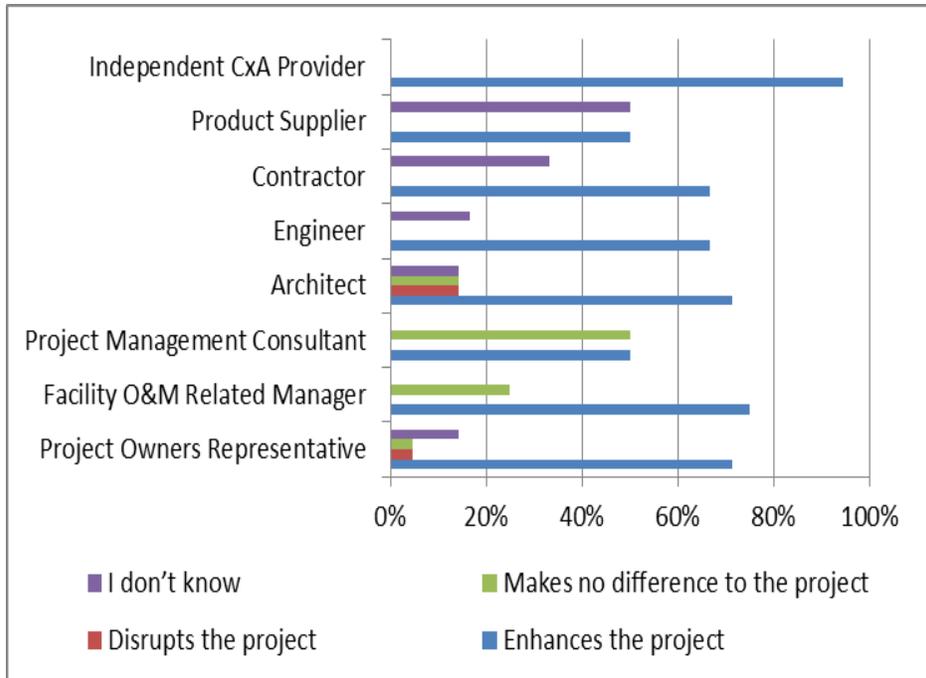
9. In your experience, do design teams do a good job of supporting and participating in Cx?



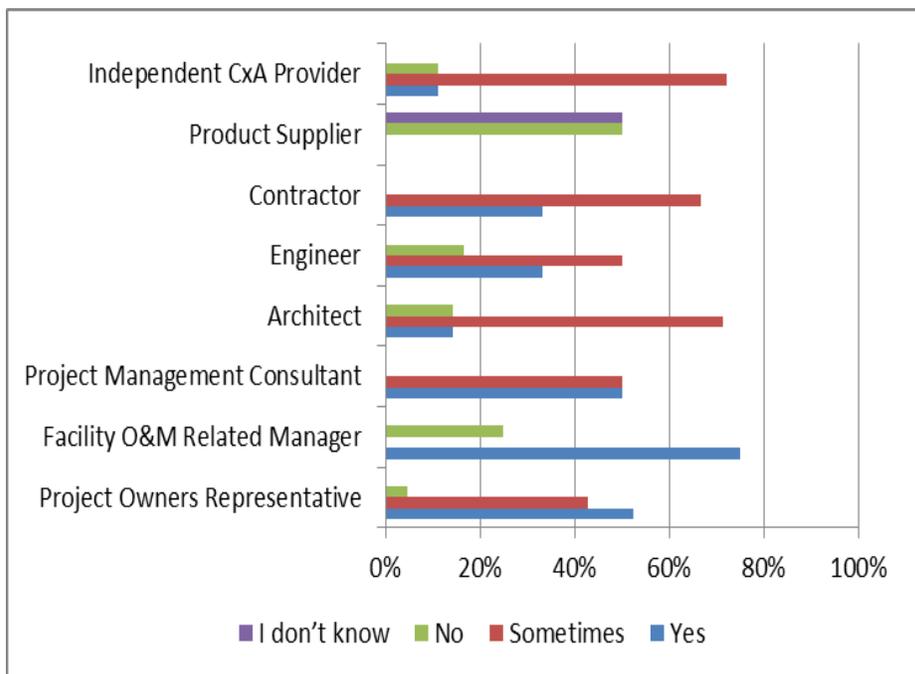
10. In your experience, do the design team contracts adequately support their commissioning roles and responsibilities?



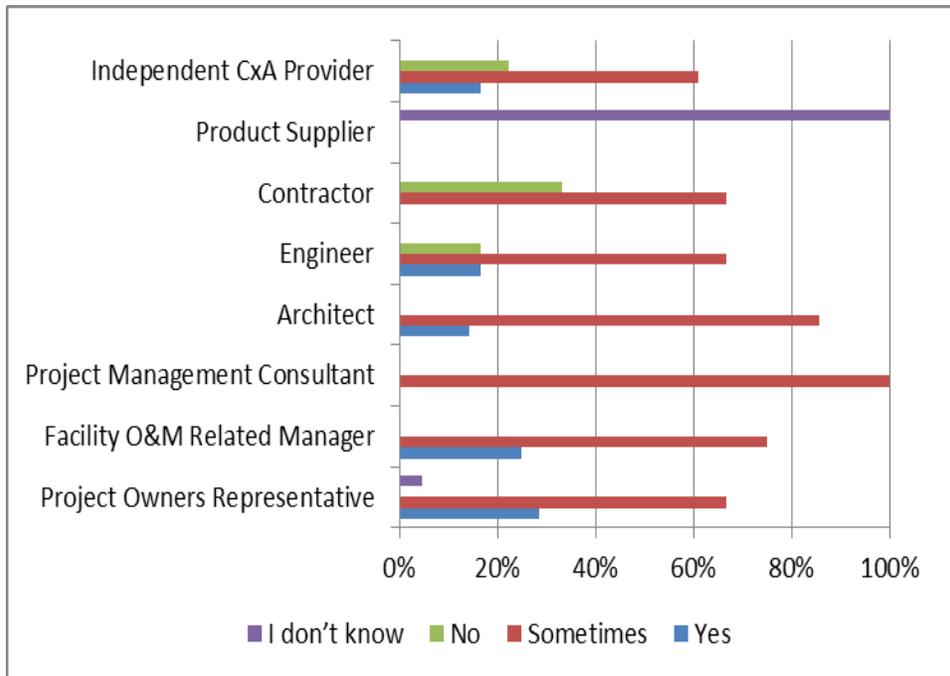
11. Select which of the following options you feel most correctly completes the statement, 'Commissioning during design...'



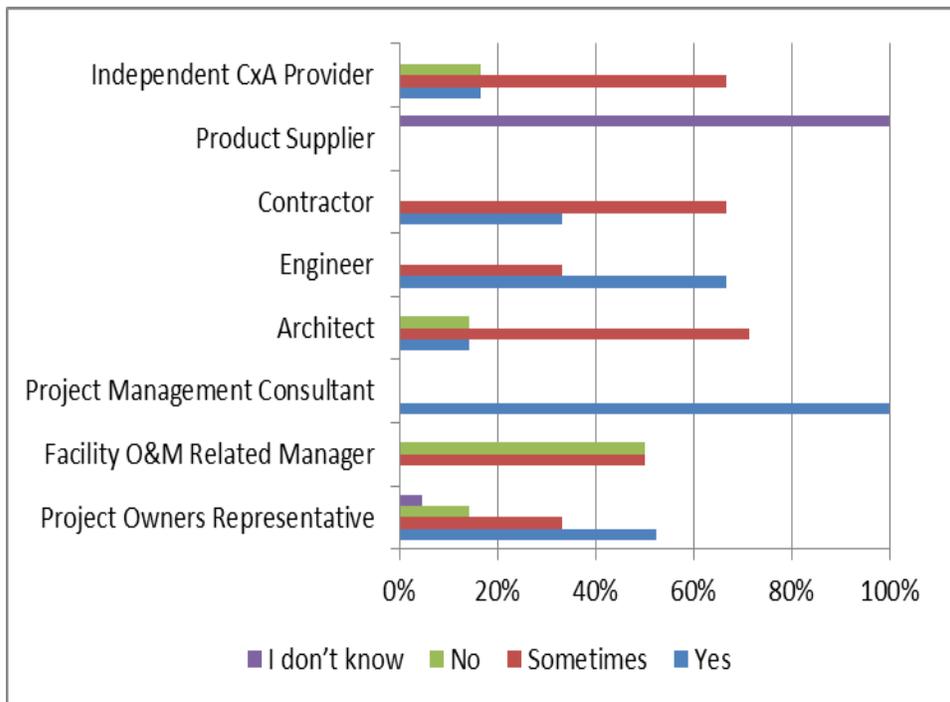
12. In your experience, are commissioning requirements and processes adequately specified in the contract documents?



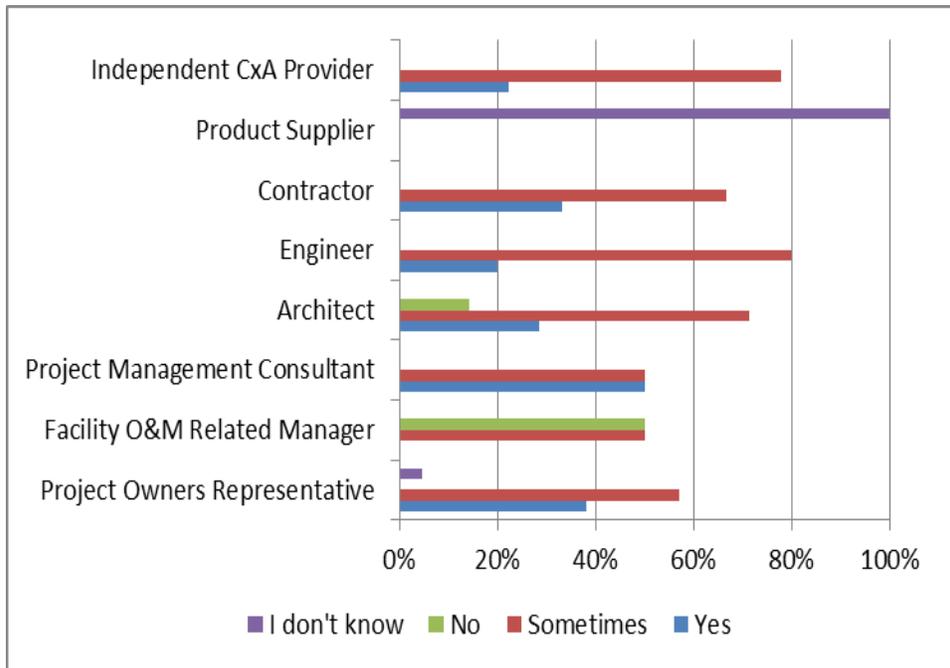
13. In your experience, are the commissioning specifications understood by the construction team?



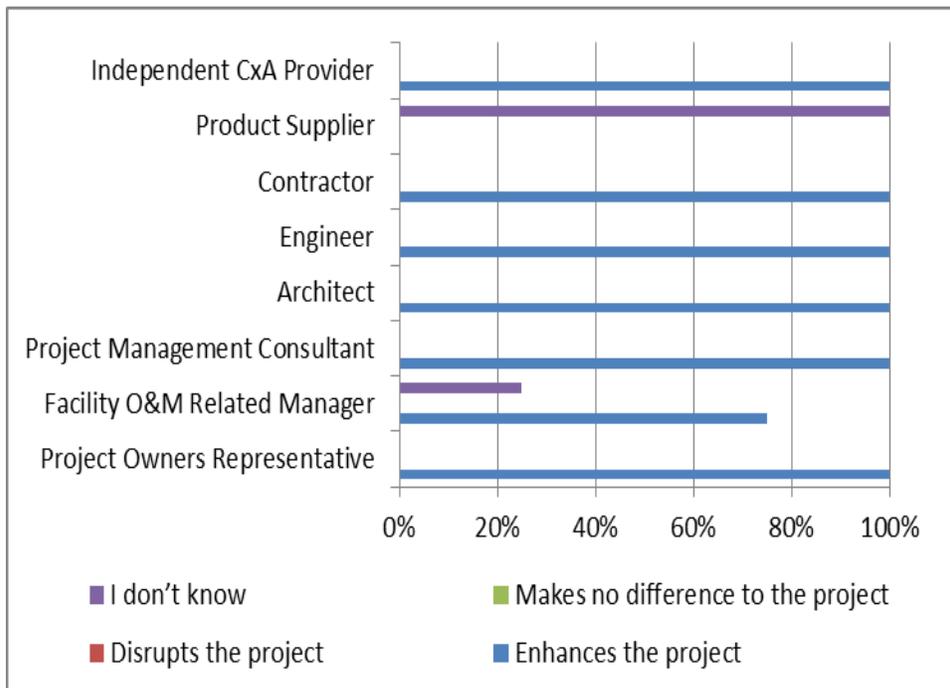
14. In your experience, are commissioning specifications enforced?



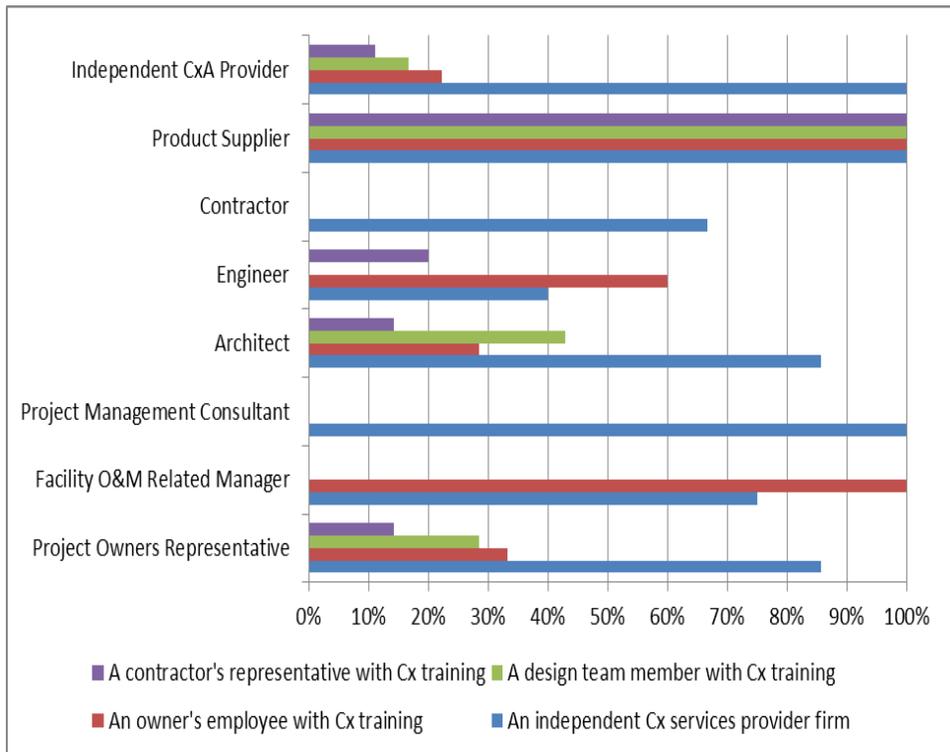
15. In your experience, does the construction team collaboratively participate in the commissioning process?



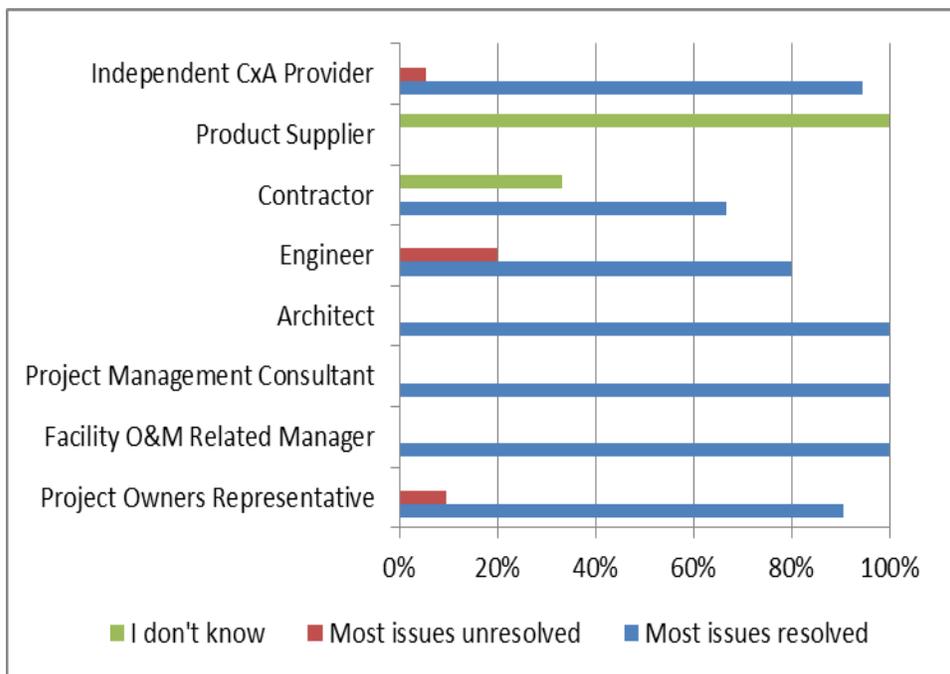
16. Select which of the following options you feel most correctly completes the statement, 'Commissioning during construction...'



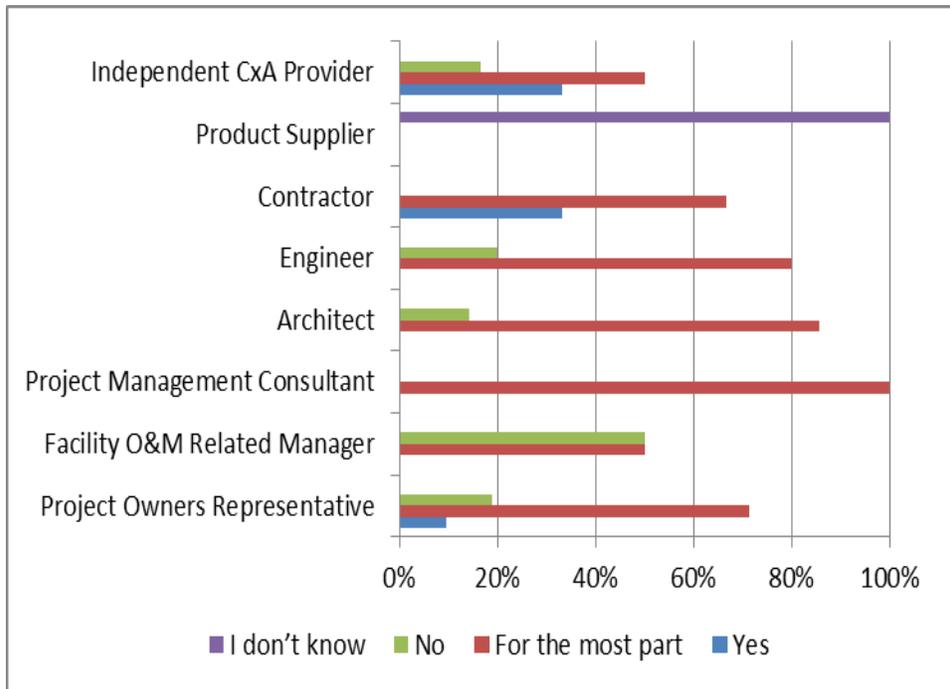
17. Who do you feel is the most appropriate choice for developing and leading the commissioning process?



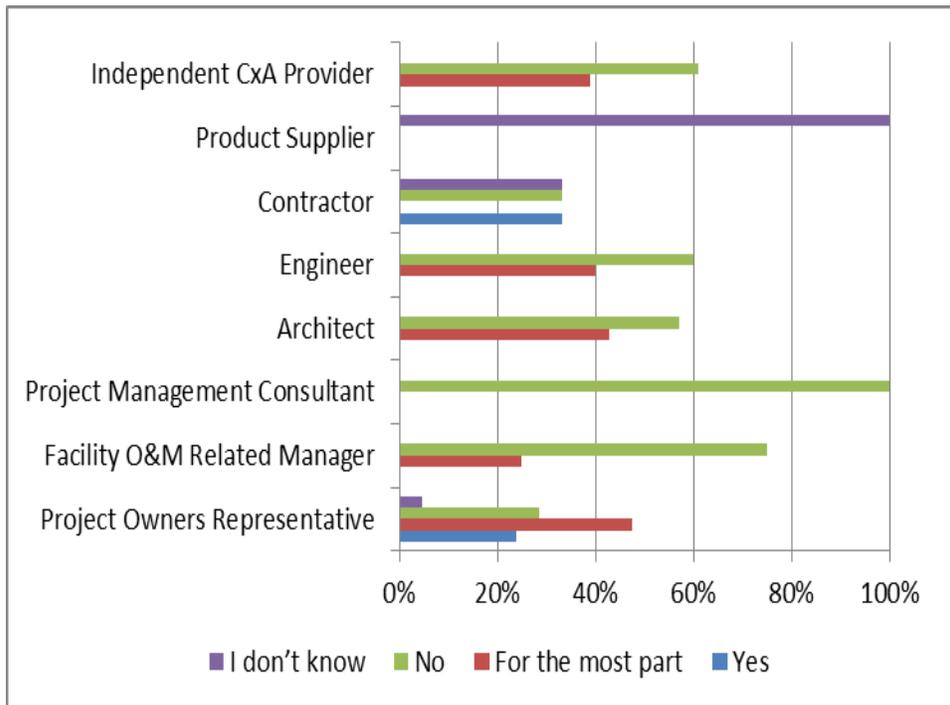
18. In your experience, are the issues discovered during commissioning generally resolved, or are a significant number of them left unresolved at the close of a typical project?



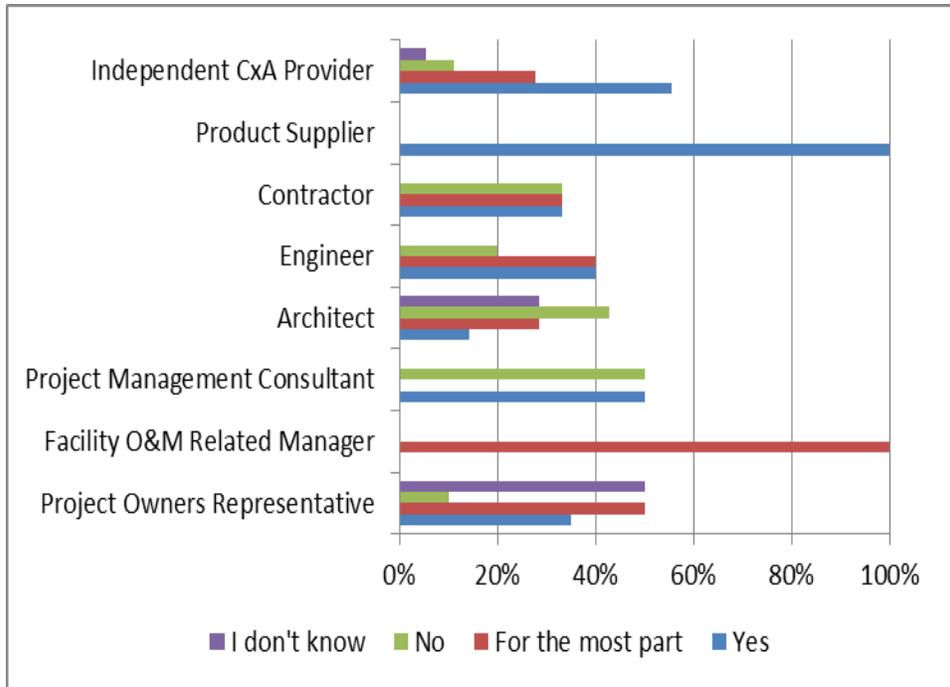
19. In your experience, is the commissioning process typically completed in a reasonable amount of time?



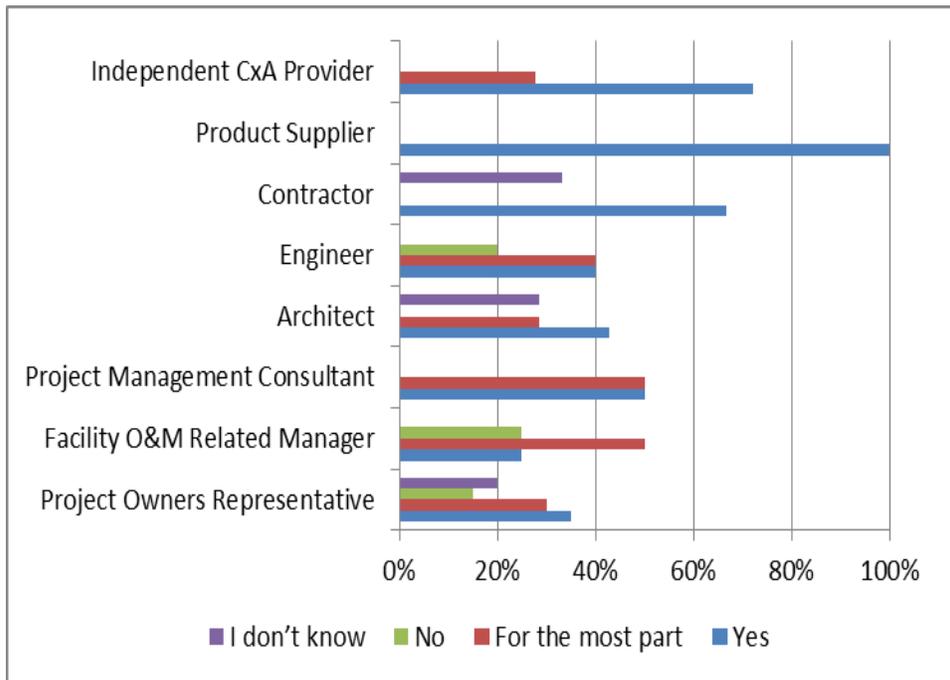
20. In your experience, are the Owner's Maintenance and Operations related staff adequately integrated into the commissioning process?



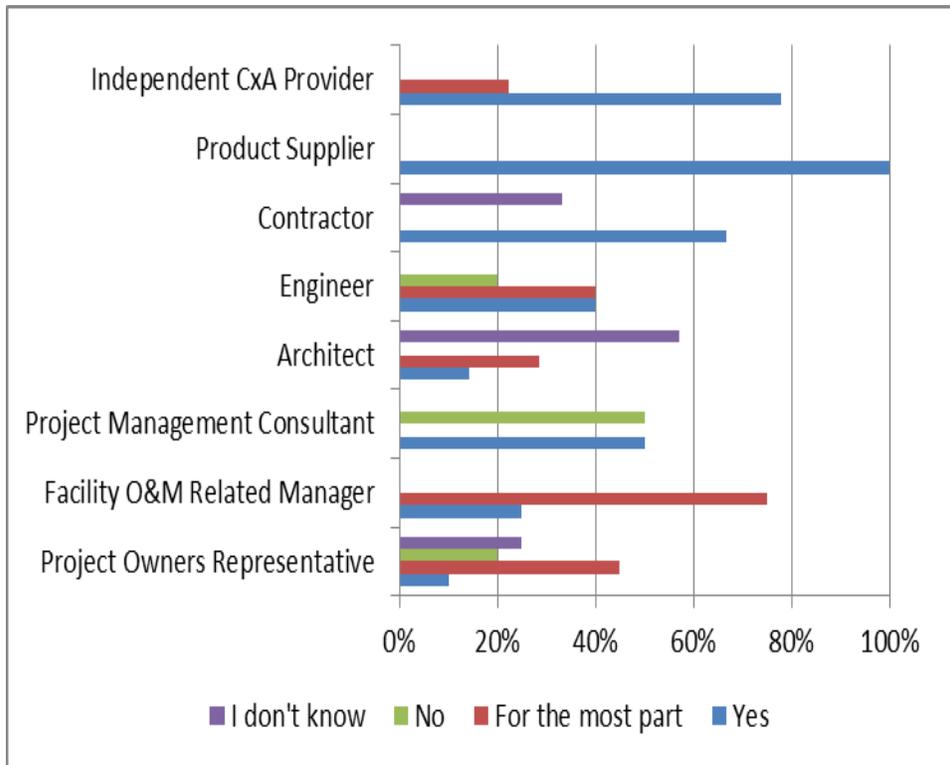
21. In your experience, does commissioning assist in turnover efficiency and effectiveness (help provide operating information)?



22. In your experience, does commissioning save operating costs?



23. In your experience, does commissioning reduce warranty issues?



24. Please provide any specific comments and/or suggestions regarding your perspective on the formal building commissioning process below, especially regarding how it could improve. (Unedited responses appear below)

I think if the commissioning process were to involve the owners maintenance, it would enhance the maintenance staffs' ability to better understand the how's and why's on the operation of the equipment and building functionality.
I recommend enhanced commissioning such that the agent reviews design docs and develops working relationship with me early on.
Not developing an OPR is a plague on the commissioning process.
Owner staff must be involved, trained and then have some sort of follow-up.
Owners' representatives present during commissioning operations. Owner review of commissioning documents.
More communication with owner.
In my opinion, the commissioning on a building is largely dependent on how savvy the owner is. Typically we see commissioning on institutional buildings where the owner is experienced in building projects. On smaller projects where the owner is building a one-of project, we rarely see commissioning. The participation of the design group within the process is largely dependent on the budget assigned to contact administration.

Commissioning company needs to be a part of the whole process from beginning to finished project.
Commissioning performed correctly is an invaluable tool for building operations and performance. Unfortunately, the marketplace is forcing commissioning into a price point rather than a qualifications based decision. This is undermining the effectiveness of commissioning and has left a bad taste in some end users mouths.
We have found that having one firm commission all the projects in a facilities plan is important and it seems sometimes I would like to have them go back and re-commission the first project right after the last project to apply "lessons learned".
Systems manual may not be emphasized.
Post-occupancy commissioning needs to become standard practice - to help tune-up in the building in the first year and help train the staff when they are not overwhelmed with all the new things at the building and have some experience with the building. Also, this is when the building is actually occupied and that can make a difference in what works.
Owners need to direct the design team to engage a commissioning authority. Specifications need to be developed and clear.
Better trained CxP's that have an accredited certification.
Thank you for the opportunity to comment. As always, when a request is made to learn how the system is working, the information given needs to be assimilated by the group asking. When comments are received and none of the ideas or comments are incorporated, what is the value in asking for a comment? Use the acquired information wisely!
It would be beneficial for owners, architects, and engineers to actively support commissioning and the benefits it has on projects.
Stronger enforcement of scheduled building and systems completion dates to ensure adequate time for functional testing prior to occupancy.
A pre-construction meeting with the owner, CM and the owner's maintenance director would assist in bringing a better understanding to what is happening during the process and how it should add value to the owner's project.
The process is currently well defined and established.
OPRs are needed, but they need to be from deep within the organization on how buildings are operated and maintained, but most importantly, design team members need to know and integrate the process and systems.
To identify and work closer with the Building Owner, so that they understand the facility and it's characteristics.
Include the owners' maintenance and operations staff in all phases of the process.
Owner / representative should accompany commissioning agent during process.
I greatly appreciate having commissioning professionals help to ensure the success of a project. My hope is that design professionals do not "relax" or become "dependent" on commissioning authorities in making the project a success.
Allow sufficient time for commissioning in the schedule.
The biggest issue we have with Commissioning Agents is waiting way too long to conduct a TAB backcheck. KBA has pulled that crap on us a few times, waiting over a year before requesting a back check on one job! Checking our work should be done within 7 to 10 days of its' completion!

Clarity on the ownership and leadership of commissioning is the biggest issue.
Need active site representation through construction, as well as participation with the design team (A, E & M) during early CD's.
Use a qualified commissioning provider with a wide range of experience to develop OPR, commissioning specifications and provide commissioning services through construction. Don't hire a commissioning firm that simply shows up with a checklist. Hire a commissioning firm that is an active part of the team that helps minimize issues through the design phase and helps to resolve issues through the construction phase.
The process could be improved by educating owners and Architects/Engineers about the benefits of commissioning.
Providing a team with A&E, contractor and a commissioning team is essential for delivering a good project.
I think certification/licensing of professionals is a big step. I think the process is improved with each project we do, as the design/construction team gains a better understanding of what commissioning is and what it can bring to a project.
Needs to be integrated into contractors' schedule better. Needs to focus on system(s) operation versus a re-check of basic items that the design team already reviews (i.e. O&M's, submittals, details of unrelated to operation, etc.).
I am a serious professional commissioning provider and recommend it to everyone so I am anything but antagonistic to Cx. However, I found this survey fraught with leading questions phrased to elicit a certain kind of answer. In reality, Owners need to be better informed to the costs and benefits of commissioning, and why a new 2017 project needs it more than an older project might have.
BCA Essential Attributes and Good Practice guides need to be enforced on contracts by Owners Rep and PM's. If not enforced, then no buy in from the project team. Commissioning should carry a % fee sum in retention if a fully embraced commissioning process in K12 Schools is to be achieved.
In my experience as a commissioning agent, I find the commissioning process as vital to ensuring that systems like the HVAC and lighting are completed and properly functioning before the owner takes possession of the building. The biggest challenge I find with commissioning is getting control contractors and electrical contractors to respond and correct issues discovered during commissioning installation audits and functional performance testing (FPT). Also, I find that very few control contractors do pretesting of the control system before FPT commissioning is performed. This will result delaying the commissioning FPT in finding issues and problems that should have been addressed during pretesting. In my opinion, the only way to get a contractor to respond to commissioning found issues is to tie the release of retention money to a sign off by the commissioning agent.
Our experience is that 90% of the success is based on the trust of the Owner with the CxP and the CxP with the contractors. If they trust the CxP to do their job and give assistance when required, the process goes smoothly and cooperation is enhanced. If the trust is not there, then the process gets adversarial and you end up butting heads instead of moving towards a successful project.
Utilize a team approach instead of commissioning agent against contractors.

Recognize that engineers are professionals and eliminate the requirement for 'outside' commissioning. While 'outside' commissioning is needed in some situations, it sometimes increases costs for all parties involved.
Projects need a realistic construction schedule in order to have a cohesive impact. Controls contractor participation is paramount in the success of the commissioning process. An accurate point to point inspection is critical, otherwise the commissioning agent ends up doing equipment startup and not true commissioning activities.
Educational and end user commissioning is key to the best use of the space.
I have recently struggled to convince K-12 project clients on the value of commissioning. It's always utilized on my higher-ed projects where the budgets are not often as tight, but the K-12 projects are often on more stringent budgets and it seems commissioning is usually cut. I look forward to the presentation.
Need commissioning agents to look beyond functional testing and be able to analyze systems under a variety of load conditions.
Might speed process working directly with Control contractor at time of commissioning.
In general, the commissioning process goes well and is beneficial to the project. Where we have seen problems is with commissioning agents who don't accept the design as a given and see their role as helping assure the proper performance of that design. They instead want to second guess the project engineers and make recommendations for alternative design approached that are often based on personal preferences.
It's great when the commissioning authority has time to understand the design in detail and has the capacity to work collaboratively with the contractor.
Irrigation system commissioning should be done by a certified irrigation designer, and in coordination with design team's irrigation designer. Doing it in isolation causes headaches and is a waste of time.
Coordination of each discipline (electric, mechanical, hardware) has proven difficult. The company commissioning needs to be more accommodating.
Commissioning needs to be more than turning over the documentation in a big binder and a quick walk through the features. Take the time to "teach" the systems and ask owners to practice while experts are physically there.
Bringing in the independent commissioning agent early in DD would be very helpful and may even assist in design of mech systems.