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Project Managers Competencies Needed in 2022 and Beyond

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Our research found that the duties and responsibilities of construction project managers are currently undergoing a significant shift. The research effort included data collected from more than 300 project managers (PMs) and validated by many industry professionals, a number of industry thought leaders and academic experts. The results show that the evolution of technology, greater access to information, rapidly evolving workforce demographics, and changing organizational structures are drivers that will compel the use of different competencies. While the future may demand new skills, it will not change the fundamental attributes associated with PMs today. Integrity, accountability, initiative, decisiveness, among other traits, will remain vital to the character of our industry project managers. In future, the PM role will require greater competence in communications, relationship building, complex decision making, business insight, risk management, diverse thinking, engagement with others, and coaching and mentoring. Even the faces of PMs are changing. Members of the younger generation will assume leadership roles as more seasoned PMs retire. Generation Y— those in their twenties—is the largest growing segment of the workforce. Preparing them for these roles is part of managing the future of project management.

Keywords: Future Trends, Project Manager Competencies, Training Roadmap

Introduction

The next decade could be the decade of the Project Manager (PM), the core individual of every successful project. It is the PM's competence and professionalism on which the Construction Industry's professional identity and reputation rests.

The CII RT281 research team's target was predicting, to the extent possible, the skills and competencies that will underlie the success of a Project Manager in an increasingly global marketplace in 2022 and beyond. The research identified new and expanded PM competencies and created a list of skills for PMs to benchmark themselves against, together with a guide to available tools to acquire these new skills and improve those they already possess.

Just as the construction industry is experiencing rapid change, the role and character of the PM is equally in a period of transition. Over the next 10 years the PM will evolve into someone much broader with more and new responsibilities than the traditional Project Manager of the past. The PM will certainly continue to oversee and direct the engineering, procurement and construction of capital investment projects but also evolve into a leader with well-developed communications and listening skills that create and nurture the all-important relationships and motivates, engages and develops others. This research indicates that the PM of the future will interface with twice as many stakeholders than the PM does today and consequently will require vastly improved leadership, people and thinking skills.

Methodology

As early as the 1960s, research in applied psychology has shown the difference between results of surveys and reality, as revealed by independent field observations (Brookover &Back 1966). This difference occurs due to the fact that when surveyed, people tend to state the generally expected answers rather than providing the real facts. Rather than relying on surveys, this research took a novel approach towards revealing the real emerging behaviors

and decision-making processes of the PMs through the utilization of games and thought-provoking exercises. The games and exercises were packaged in a one-day continuing-education seminar and allowed the researchers to collect specific data about the decisions made by each PM in a simulated environment. 338 PMs, representing 15 CII owner and construction companies, participated in those seminars which included three types of exercises. Their participating results and data were collected and analyzed to obtain a more real reflection of their experience, views, and opinions. Table 1 shows the exercises used in this one-day seminar, and the type of data collected. For each PM the following 24 variables were also collected: 1. Gender; 2. Culture where PM was raised; 3. Highest degree of level of school; 4. Discipline experience prior to becoming a PM (e.g., Design, Project Controls, etc.); 5. Years of EPC Industry experience; 6. Years worked as a PM; 7. Number of projects led as a PM; 8. Role of current organization (e.g., owner, contractor); 9. Sector of current organization (e.g., public, private); 10. Location of projects led as a PM ; 11. Industries of projects led as a PM; 12. Years to retirement; 13. Number of projects managed simultaneously; 14. Most recent project: project scope (e.g., Engineering only, EPC, etc.); 15. Most recent project: type of contract (e.g., cost reimbursable, lump sum, etc.); 16. Most recent project: geographical region; 17. Most recent project: sector (e.g., public or private); 18. Most recent project: multiple engineering office locations; 19. Most recent project: offsite fabrication; 20. Most recent project: duration; 21. Most recent project: number of project employees; 22. Most recent project: Total Installed Cost of contract scope; 23. Additional responsibilities concurrent to PM role; 24. Average hours worked per week.

Table 1
Exercises used in the one-day seminar.

Games/ Exercises	Description	Variables
Hassles In Construction Exercise	PMs need to develop good facilitating skills, and to be an effective problem solver. In this exercise, PMs work together in teams using the 7-step improvement model to improve their facilitator skills and find solutions to reducing job hassles while revisiting current and future skills, competencies, and attributes.	25. Five attributes that will become more important in hiring PMs in the future 26. Top 10 Current PM Competencies (10 years ago and today) 27. Top 10 Future PM Competencies (10 years from now)
"Who's On Your Molecule?" PM Diagnostic Tool	Effective leaders have great interactions and relationships with everyone in their network. This Self-Diagnostic Tool helps PMs understand how they fit into the organization. The Six-Step Evaluation Process measures the quality and importance of the PM's relationships with the people encountered daily and helps them recognize where to best focus their efforts to become a more effective project leader.	28. Total number of stakeholders 29. Number of external stakeholders 30. Number of internal stakeholders 31. Average quality of relationships 32. Hours/week of discretionary time 33. Hours/week of institutionally imposed time 34. Hours/week working on the computer (excluding emails) 35. Hours/week answering e-mails 36. Hours/week dealing with technical questions on the project 37. Number of stakeholders PMs will have in 10 years
PM Magic Deck of Action Card Game	Playing games is educational and intensely thought provoking for all participants. In this particular card game, the PMs work together in teams to propose, defend, and agree on corrective actions that address the issues plaguing a "project from hell." After the game session, the PMs are able to explain the influence of their actions, recognize and articulate their own leadership styles, and ultimately find the correct balance between management and leadership that will drive the most successful project performance.	38-40. Influence of leadership training on actions that ensure success for a new project 41-43. Influence of leadership training on actions that ensure success for an ongoing troubled project

An additional 19 variables (some of them, such as top 10 actions selected, being vector variables) were collected for each PM. The data was then checked for completeness and processed through a data mining software (SIPINA - Sipina 3.5, 2000). Of the 338 PMs, 233 provided complete data vectors (69% of the sample population). The mining of the 233 data vectors produced 133 "data mining trees" – a graphical representation of the relationships between variables. Each decision tree was reviewed, discussed, and selected after being filtered through an industry based reality and experience filter. The challenge of the researchers was to identify what will happen in the future and not categorize and discuss what happened in the past. Table 3 summarizes the findings related to PM competencies. Additional trends were identified, but due to the length constraints of this paper, some of those findings are reported only in the conclusion section of the paper.

More details about the seminar and the research methods have been published by Wiezel et al. (2011).

First Finding, Trends and Challenges for the Construction Industry

One important finding of this research was the realization that there are four disruptive trends on the horizon, generating a total of 19 challenges. This effort entailed significant amount of literature review about future trends in industry and especially in construction. A partial list of the literature used in this stage of the research is provided in reference section of this paper. The data collected was then grouped, prioritized and discussed by a select group of industry thought leaders with vast experience in the construction industry. See Table 2 Trends Forecast below.

Table 2
Forecast of Trends and Challenges

Trends	Challenges
Globalization	1. Projects in areas with difficult conditions 2. Safety issues & training beyond traditional areas 3. Price/schedule/resource pressure means more competitiveness 4. Global supply chains 5. Relationship building at multiple locations 6. Balance traditional success factors w/ sustainability objectives & compliance 7. More oversight and regulation
Workforce Demographics	8. Workforce diversity, dynamics, and styles
Technology	9. 24/7/365 access from all directions 10. Information collected faster than resources can manage & analyze 11. Information for decision-making will change in minutes 12. Constantly evolving project methods, systems, and software tools 13. More work done off-site 14. Global, virtual teams
New and Changing Organizations	15. Increase in number of stakeholders with competing agendas 16. Increase in number of non-fulltime/ contract employees 17. Shifts in risk sharing models (more JVs, etc.) 18. Low cost execution centers with more capabilities 19. Increased probability of unexpected (""black swan"") project risks

It is worth noting that at least one of the trends (technology) is already affecting all the construction companies. Some of the larger companies are exposed to more of those four trends. The combination of the challenges (of the 19) that will be faced by each company depends on the type of markets the company is in. To respond to these challenges, PMs have to have certain competencies (see next section). The challenges and the PM competencies required to answer them, have been combined in an instrument, called the "meta-tool" (i.e. a tool for selecting tools).

The meta-tool allows the construction companies (or PMs) to select the best education continuous education tools to develop the required competencies. The Meta-tool is presented later in this paper.

Second Finding, PM Competencies

The future PM competencies lend themselves towards a grouping of four competency areas which included a total of 14 PM competencies.

Table 3
Competency Areas and Future PM Competencies

Competency Areas	Future PM competencies
Technical/Virtual: knowledge and skills related to the involvement or use of technology	1. **Is technically multi-disciplined.** Demonstrates knowledge across multiple technical, project management, and construction disciplines with deep expertise in at least one. 2. **Demonstrates practical understanding of technology.** Is up to date on project-related technology and uses it effectively to lead and enable team members to work efficiently**.**
Management: a set of activities, procedures, boundaries, and structure that allows an organization to achieve its goals in a disciplined way	3. **Possesses keen business insight.** Embraces the parent organization's strategic purpose/goals and translates these into practical concepts relevant to the project. 4. **Understands project management.** Knows and executes the policies, processes, procedures, and best practices that lead to successful project execution. 5. **Builds knowledge networks.** Creates and maintains global knowledge network inside and outside of the team and organization. 6. **Monitors risk continually.** Persistently monitors known and unforeseen strategic and operational risks to maintain a robust response capability.
Cognitive: the intellectual process that enables one to learn from, make sense of, and disseminate information	7. **Communicates effectively.** Listens to understand and is able to articulate ideas and complex concepts clearly and convincingly to a wide range of audiences. 8. **Displays emotional maturity.** Understands and controls emotions while showing empathy for others and using these skills to lead others. 9. **Makes complex decisions.** Thinks analytically, conceptually, and adaptively and makes sense of new information across multiple levels of detail.
Leadership: traits designed to align, motivate, and inspire a team to act and achieve project objectives	10. **Leverages diverse thinking.** Uses the power of diversity to benefit from cultural, gender, experience, and generational differences. 11. **Builds relationships.** Builds collaborative relationships with clients, peers, global knowledge networks, subordinates, and superiors to achieve business objectives. 12. **Engages others.** Demonstrates active involvement, fosters teamwork, aligns differences, and leverages individuals' talents to achieve objectives. 13. **Mentors people.** Consistently teaches, coaches, and mentors to help ensure individual and team success, as well as develop the next generation. 14. **Builds trust.** Practices chosen leadership truisms that enable others to have a firm reliance on their character and competence under stress.

Meta Tool

To cope with the 19 challenges, organizations or individual PMs need to identify the competencies that respond to those specific challenges and develop a study program that includes the most effective sessions for developing the required competencies. A special tool was developed by the researchers to address this problem. This tool, that helps finding the learning tools, was called "meta-tool" (i.e. the tool for tools). The tool (see Appendix A) contains two

parts, each on one page. Part one (and hence page 1) links the 19 challenges to the 14 competencies need to address those challenges. Part two links various (existing) study sessions to each competency. This second part consists of an evaluation of the effectiveness of each study session for each of the 14 competencies. We used a scale from 0 to 4, with the following values: 0 - Minimal influence on the competencies, 1 - Some influence on the competencies, 2 - Improves competencies, 3 - Strongly improves thinking (competency), 4 - Changes thinking (competency). The initial thought was to use the whole scale for assembling development programs, but subsequent uses have demonstrated that it is enough to consider only the values of 3 and 4 in recommending session. The list of available sessions will probably vary form company to company, but each company can develop their own curriculum by using a customized version of the meta-tool.

Conclusions and Recommendations

- It is unquestionable that the PM of the next decade will have to contend with deep underlying global forces and quickly respond to surprising breakthroughs and an accelerating rate of innovations.
- Four disruptive trends can be discerned on the horizon that will introduce, over the next decade, substantial challenges for the project management profession. (1) Globalization, (2) different workforce demographics, (3) rapidly evolving technology (particularly in the information and data management area) and (4) unprecedented organizational structures will demand new project management skills.
- Each of the four disruptive trends presents a number of specific challenges. The nineteen challenges identified include: projects in areas with difficult conditions, global supply chains, balancing traditional success factors with sustainability objectives & compliance, information for decision-making changing in minutes, global virtual teams, increase in number of non-fulltime/ contract employees.
- A versatile PM with the competencies to successfully deal with a diverse and changing set of challenges will be a valuable asset to the industry. They will add a value that exceeds what other competitors would offer and will be one of the ways to stay ahead of the competition and become the project management team of choice. The competencies of these PMs fall into four competency areas: (1) Technical / Virtual, (2) Management, (3) Cognitive, and (4) Leadership.
- Because the PM of the future will interface with twice the number of stakeholders than the current PMs she or he will require vastly improved leadership, people, and thinking skills than those needed in the past or even today.
- Cognitive competencies, closely related to leadership, will be recognized as an important aspect demanding special attention by future PMs. They are the intellectual processes that enable individuals to learn from, make sense of and disseminate information effectively. The cognitive competencies include: effective communication of complex ideas to a wide range of audiences, emotional maturity, making complex decisions.
- Technical and management activities that dominated a PM's actions in the past and often still do today, will increasingly be taken over by electronic tools and become less dominant, although still important, even while their complexity increases.
- There is considerable synergy and some overlap between the competencies. Nevertheless, each competency was chosen to place emphasis and focus in a specific area that the research determined as essential to combat the disruptive trends that lie ahead.
- The competencies are additive and the successful PM will need the entire competency tool kit. The emphases on certain competencies are predicted to vary due to individual leadership style and/or project circumstances.
- In the future, the project management curriculum offered by the industry professional organizations and universities will need be expanded to include an emphasis on the development of cognitive and leadership competencies.

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Appendix A Meta-Tool Page 1

Meta-Tool: Project Manager Competency Development Selection Tool - Page 1 of 2

INSTRUCTIONS: Note that this tool spreads on two pages. You are holding page 1 of 2. **(1)** Hold this sheet in portrait orientation so that the red "START" arrow points downwards towards the 19 challenges. **(2)** Following the direction of the STRAT arrow, checkmark those challenges that will be relevant in your future. Use the checkbox at the left of each challenge for this purpose. **(3)** For each challenge you selected, mark each of the checkmarks in the row of that challenge. Leave the rows of the unselected challenges unmarked. **(4)** Turn the page to landscape mode so that the "SELECT" arrow points downwards, towards the 14 competencies. **(5)** Count the checkmarks in each row and write the result in column "Count [x]". Each of these numbers represents the importance of the particular competency to your future. **(6)** Select the competencies that will be most important in the future. (7) Take page two and mark the competencies you selected, then highlight the values of the Learning Tools in the columns to the right of those competencies. **(7)** Sum up the values you highlighted for each column in the Learning Tools area. **(8)** The sums indicate the effectiveness of each learning tool for the challenges and competencies you selected. Assemble a study program based on the effectiveness of the learning tools and the time you can dedicate. Unless otherwise specified, assume that each learning tool takes 1 hour. Add one more hour (total) for starting / closing the day. The numbers in straight brackets [] represent the pre-requisites for each session.

V 3.01

PROJECT MANAGEMENT COMPETENCIES OF THE FUTURE

START

CHALLENGES	DISRUPTIVE TRENDS: GLOBALIZATION										WORK-FORCE	TECHNOLOGY										NEW & CHANGING ORGANIZATIONS										COUNT ☒	COMPETENCIES — See definitions on the other side of this page — SELECT																		
☐ 1 Projects in areas with difficult conditions	☐										☐	☐										☐										☐																			
☐ 2 Safety issues & training beyond traditional areas		☐											☐										☐									☐																		
☐ 3 Price/schedule/resource pressure means more competitiveness	☐		☐									☐		☐										☐							☐																		
☐ 4 Global supply chains		☐		☐									☐		☐									☐							☐																		
☐ 5 Relationship building at multiple locations	☐		☐		☐						☐	☐		☐		☐								☐							☐																		
☐ 6 Balance traditional success factors w/ sustainability objectives & compliance		☐		☐		☐							☐		☐		☐							☐							☐																		
☐ 7 More oversight and regulation	☐		☐		☐		☐				☐	☐		☐		☐		☐						☐							☐																		
☐ 8 Workforce diversity, dynamics, and styles	☐		☐		☐		☐				☐	☐		☐		☐		☐						☐							☐																		
☐ 9 24/7/365 access from all directions		☐		☐		☐		☐			☐		☐		☐		☐		☐						☐							☐																		
☐ 10 Information collected faster than resources can manage & analyze		☐		☐		☐		☐				☐		☐		☐		☐		☐						☐							☐																	
☐ 11 Information for decision-making will change in minutes			☐		☐		☐		☐				☐		☐		☐		☐		☐						☐							☐																
☐ 12 Constantly evolving project methods, systems, and software tools			☐		☐		☐		☐					☐		☐		☐		☐		☐						☐							☐															
☐ 13 More work done off-site	☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐						☐							☐														
☐ 14 Global, virtual teams		☐		☐		☐		☐		☐			☐		☐		☐		☐		☐		☐						☐							☐														
☐ 15 Increase in number of stakeholders with competing agendas			☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐						☐							☐														
☐ 16 Increase in number of non-fulltime/ contract employees																								☐							☐																
☐ 17 Shifts in risk sharing models (more JVs, etc.)																								☐							☐																
☐ 18 Low cost execution centers with more capabilities																								☐							☐																
☐ 19 Increased probability of unexpected ("black swan") project risks																								☐							☐																
COUNT ☒																																																	

Transfer your selection to page 2

Page 1 of 2

Meta-Tool: Project Manager Competency Development Selection Tool - Page 2 of 2

This is page 2 of the Meta- tool.
Trasfer here your selection of competencies from page 1.
See instructions on page 1.

COUNT ☒	COMPETENCIES (See definitions on the other side of this page)		LEARNING TOOLS — Fundamentals									Emerging Leaders																					Advanced				
	SELECT		1 Good Boss Bad Boss	2 Leadership vs. Management [1]	3 Understanding how people think	4 Core Values	5 DNA of Leadership	6 Laughter for Leaders	7 Oops Game (2h)	8 StrengthFinder	9 Ethics [4]	10 PM Magic Action Cards Game (2h)[1]	11 Thinking Techiniques (1 to 6h)[3]	12 Thinking Traps [3]	13 Who's On Your Molecule (WOYM) (2h)[2]	14 Motivation Fundamentals [2]	15 Learn from the Masters [14]	16 DISC and Communication [2]	17 Micro-communication [16]	18 Time Management [2,13]	19 Hassle Exercise (2h)[13]	20 Building Trust [1,14,17]	21 Team Building [20]	22 Conflict Management [14,19]	23 Competitive Edge [18,20,22]	24 Difficult Bosses [1,14,20,22]	25 Leading Upwards [1,13,20]	26 Cross-Cultural Communication (2h)[16,17]	27 No Rules Leadership Styles [3,14]	28 Leader's Toolbox (2 h)[3,13,14]	29 Level 4 Case Studies [19]	30 Organizational Molecule [13]	31 Leadership Techniques [14,17,28]	32 DISC for Leaders [4,8,16]	33 The Leadership Plan [13,18]	34 Senior Executive Game (4h)[culminating]
	1. Technically multi-disciplined	TECH					1					2		1	1						2															2
	2. Practical understanding of technology	TECH					1					1			1						1															1
	3. Possesses keen business insight	MANAGEMENT	2	1		2	2		2		2	2			2	2		3	3	3	2	2	2	2	3	2	3	3	1		3	3	1	2		4
	4. Understands project management	MANAGEMENT	1	2	1	1	2		2	2	1	3		1	2	1				4	2	1	2	2	1	1	2			4		2	1		2	3
	5. Builds knowledge networks	MANAGEMENT		1	3		2			3		2			3	3		1			2	2	2	1						2		1	1			3
	6. Monitors risk continually	MANAGEMENT			2		1		4			2		1	2			1	1		2	1							1		2					3
	7. Makes complex decisions	COGNITIVE	2		4	3	2	1	3	3	3	3	4	4	2	1				2	2	1	1	1	2					2	2	4	1	2	2	4
	8. Displays emotional maturity	COGNITIVE	2	2	3	2	3	4		2	2	2	4		2	1	2	1	1	1	2		1	3		2	2			3		1		4	1	4
	9. Communicates effectively	COGNITIVE			2		3	1		2		2	4	2	3	2		3	3		2	2	2	2				3		4		3	3	4		4
	10. Leverages diverse thinking	LEADERSHIP	3	3	4	2	2	1	3	3	2	3	4	3	3	3	1	1		1	3	1	1	1	1	2	2	3	3	3	1	3	3	3	1	4
	11. Builds relationships	LEADERSHIP	3	3	3	3	3	2		2	2	3	4	1	3	4	2	3	3	1	2	3	3	2	1	3	3	3	3	4	1	3	3	3	1	3
	12. Engages others	LEADERSHIP	3	3	3	3	3	2		2	2	3	4	1	3	4	2	3	3	1	2	3	3	2	1	3	3	3	3	4	1	2	3	4	1	4
	13. Mentors people	LEADERSHIP	3	3	2	3	2	1		2	3	2	1	2	3	3	2	3	3	3	1	3	1	2	3	3	3	3	2	3	2	3	3	3	3	2
	14. Builds trust	LEADERSHIP	3	3	3	3	3	1		1	3	2	2	1	3	4	1	2	2	1	2	3	2	1	1	2	1	2	1	4	1	1	3	3	2	2
	SUM																																			

SCALE FOR EFFECTIVENESS OF LEARNING TOOL:

0 - Minimal influence on the competencies
1 - Some influence on the competencies
2 - Improves competencies
3 - Strongly improves thinking (competency)
4 - Changes thinking (competency)

ASSEMBLE STUDY PROGRAM

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