

A Journey Through Artificial Intelligence and Project Management

Stacy Goff

Background

In late 2019, I was invited by Spring (Yanjuan Yu), lead reporter of Project Management Review, to weigh in with my opinions about Artificial Intelligence and Project Management. She had also asked other industry participants to do so. In response to her questions (listed below), I felt it was important first, to establish my context with the subject. That response begins on this page. And I end this article with my reply to Spring's actual questions.

Spring's Questions

Dear Stacy,

We are so honored to invite you to participate in PMR's opinion collection on the topic: AI and PM among opinion leaders across the globe. Your opinions on the following three questions will be huge significance to us and will be quoted in PMR magazine together with others'.

1) The impact of AI on the profession of project management (both benefits and challenges)

2) The top / must-have qualities for PMs to excel in the AI era.

3) The suitable leadership style for the AI era.

We are not in a rush and the date for submitting the answers is before October 15. Thanks for your time.

Best regards,

Spring

My Context For This Topic

I do not consider myself to be an Artificial Intelligence (AI) expert. Instead, I am merely a student of (and enthusiast for) different aspects of human + machine interaction. I have explored early examples of those interactions in a 50+ year range of roles, including applications developer, project manager, and global project/program consultant. Before I address the three questions asked of me about AI and PM, I feel the need to add some context. Thus, this section, with examples, of my primitive AI work.

While researching recent articles on AI (as it relates to project management), I found multiple different definitions and levels on the subject, from a wide range of authors. Most move from very basic applications, to current reasonable examples, to very advanced concepts, that may require years to achieve. So here are the levels I will use, blending various authors' sources with my own experiences.

Multiple different types of AI

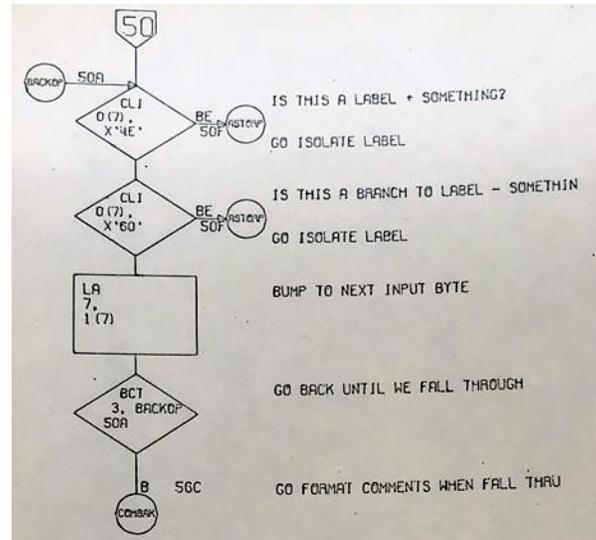
- A. Improve efficiency, and re-use processes
- B. Decision support systems
- C. Performance support systems
- D. Knowledge management systems
- E. Machine learning, moving toward Sentient systems

The examples I share in this section used information systems as tools, to improve and speed up human performance. Only the last set of examples move into the advanced level E, in my list above.

Example 1: Improve Efficiency, And Re-Use Processes

In 1968, my systems development supervisor suddenly mandated that our entire library of business applications needed flowcharts, to improve maintenance and enhancements. This would be a massive job, requiring months of effort, and unnecessary work for hundreds of programs that were seldom modified.

So I worked with a peer, after working hours, to put together a set of programs that would input each program, interpret the code, and produce either a useful printed flowchart, or plotted flowchart (example at right). Our application produced these flowcharts for FORTRAN or Assembler language programs, using a 32K IBM 360 computer, and optionally, a Calcomp plotter. We complied with my supervisor's intent, and saved hundreds of hours of effort. Note that our solution did require good comments in the program code, to aid usability.



Interested in project management, I re-used much of the same code and logic to generate professional PERT Charts with a solution that was superior to commercial software packages that cost over \$10,000, and were not nearly as powerful. Those packages required the user to locate the positions of up to 1000 activities on a grid; our version figured out the optimum position automatically, with minimum paths crossing. I donated the resulting application to the Calcomp User Library, and it was licensed and applied by others.

Example 2: Decision support systems

Ten years later, in the mid-late 1970s, I had moved from developer, to analyst, to project manager. I was working in Lane County, Oregon, on one of the first Geographic Data Systems outside the Air Force. We were 'digitizing' the X, Y and often Z coordinates of everything that one could map. The maps included roads (with traffic volume and speed), property boundaries, zoning, soil types, vegetation types, and even how deep one must drill to get to usable water below the arsenic layers. And, much more. The data came from a range of sources, including cooperating government agencies, local, state and federal.

The resulting system provided decision-support for tactical and strategic decision-making. For example, if a robbery occurred at a downtown location, the police or sheriff's deputies typically head for the robbery location. We demonstrated a simulation at a major USA conference of police and sheriff's deputies that forever changed their pursuit practices: We showed, with our modeling, a video of our massive computing-power simulation, showing the three most-likely locations to intercept the thieves, five, ten and fifteen minutes after the robbery. Thieves seldom hang around after a crime and wait for the cops to show up; instead, using our data, we showed how to significantly increase their chances of capture.

A strategic example: In the late 1970s, the State of Oregon passed laws that required counties to prove they are not allowing development on farmable land. Those who could not prove their case were forbidden to develop land for years. The Lane County Geographic Data System provided proof in a 15 minute computer search that in the last three years, our County had **never** approved development on farmable land. For three more years, Lane County was the only county in the state that could continue development. I asked the County Commissioners to estimate two valuation benefits: 1) the direct-to-county income that resulted from that decision, and 2) the economic value to the county's citizens and business. They estimated those values to be in the millions, and tens of millions, respectively.

Example 3: Performance Support Systems

In the mid-1980s, I worked with an associate to develop THE Guide (now named WiSDM), a systems engineering, and project management methodology. One challenge we faced was that most project standards of the era were weak and incomplete. We started our method with early project inspiration, and ended with demonstrated business benefits. We built a personal computer-based modeling system to help project teams and managers to scope, estimate, select approaches (each with a fully-populated project plan), identify the greatest factors that affected costs and duration, model decisions that could accelerate results and lower costs. It then instantly produced a fully staffed model project plan. You can see a video of parts of our Plan By Example™ process by clicking the link in the footnote below.

The models we used include The 20 Questions, our most-important questions to answer to plan any Information Technology project, Barry Boehm's COCOMO II factors, buy versus build considerations, and other factors that managers and sponsors can influence, such as levels of customer engagement, level of talent supplied (and their availability, when needed), and speed of decision-making. We used the models with many of our customers, including those in aerospace and defense, banking, 'big oil,' government agencies, and consultancies. Our consulting use of the model we named Rapid Initial Planning; it collapsed a 4-8 week project initiation to a 1-2 week duration, using intensive large-group facilitation.

The combination of our performance support system and Rapid Initial Planning, together with top executive commitment to engage the right stakeholders in the process, worked wonders. We also used it with enterprise portfolio prioritization, identifying duration, costs, and staffing requirements for each initiative in the portfolio, then modeling the changed completion dates when new priorities emerge.

Example 4: Knowledge Management Systems

Can a knowledge management system support improved Risk Management? Yes! In 1987, one of the "Big Eight" IT consulting firms asked me to interview for a consulting contract for which they were soliciting bidders. Their objective: "Win More Bids, and Profit More on Bids Won." Succeeding at one of those objectives is easy. Win more bids by bidding lower. Make more profit by bidding high. Succeeding at both requires a major organization commitment. Because I clearly showed how they could meet both objectives during my interview, this "Big Eight" firm selected us to help them achieve that goal.

To do so, we reviewed and improved their estimating and bidding; we paid special attention to their risk management history and methods. In that era, it was common practice to charge customers to manage their own risks. We pioneered a different approach. Our innovation: Using our client's risk knowledge-base, we identified risks that customers were willing to commit to manage as contract exclusions. This (once customers recovered from shock) resulted in significantly lower bids. Then we integrated our risk management processes and differentiating PM methods into their Systems Engineering methods.

We developed a custom Project Management Workshop for their Senior Consultants and Managers. We trained their trainers for rolling it out worldwide. The result: this firm not only met both objectives, they moved from #4 to #2 in the Big 8 rankings. And, their newfound approach transformed the way all the major consultancies estimate and bid projects, and manage risks, 30 years later. So, why did this work?

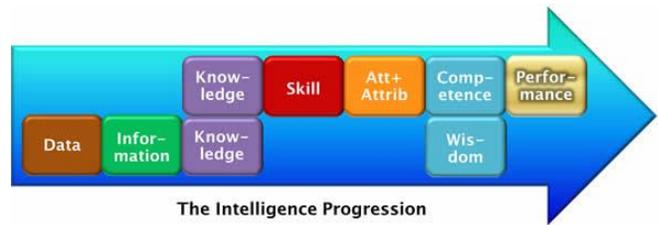
The job of a project (or program) manager is not to manage risk. Clearly true, because anything the PM can manage **is not a risk**. Instead, the PM's job is to find those who can do so, transfer that responsibility to those persons, and then monitor and manage their success in doing so. In managing risk, your project team can wield multiple resources, in your risk intelligence base:

- a. Project risk history; for an existing client, or for an entire industry; the same risks often repeat;

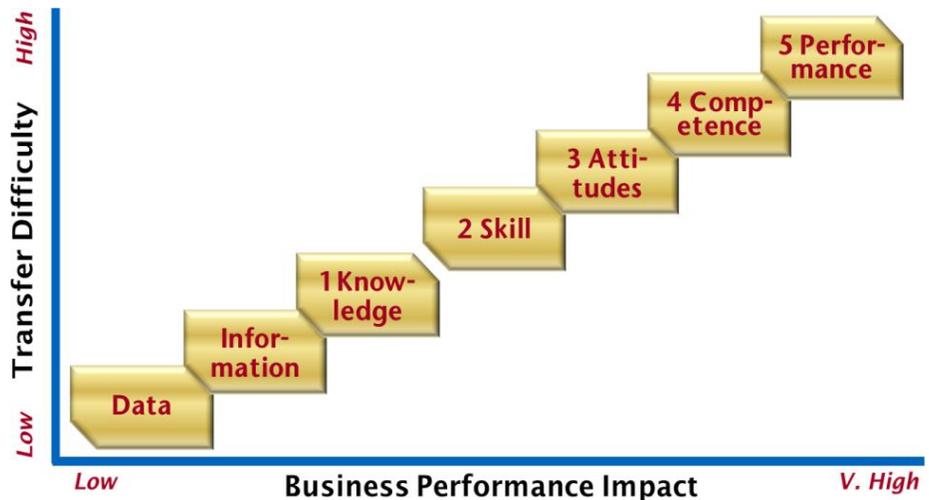
- b. Estimate assumptions, issues, risks realized, failures, and lessons learned are all the same project intelligence, with different project timings. As above, they are often repeated. This is a valuable resource in risk identification and impact analysis.¹
- c. The same people consistently disappoint you.

Emerging from our 1987 Risk Management innovations for the Big Eight firm was a process and knowledgebase. However, in our agreement to avoid disclosing our results to the firm’s competitors, we needed to wait five years after the project’s end. Applying William Duncan’s guidance that a properly stated risk is in the form of an *If... then* statement, we captured and tuned a knowledgebase of risks, plus risk responses that typically work well. Today, we continue to use our risk management tools and processes in our Portfolio Planning and Rapid Initial Planning consulting.

Knowledge and Talent Management: In my continuing search for knowledge management, I participated in one of NASA’s Knowledge Forums, I learned much more about Knowledge, including the assertion that it is far more important to manage enterprise knowledge, than individual knowledge. A result: I adjusted my *Intelligence Progression* that I had used for years; see the revised version above.²



I further explore my discoveries in knowledge management systems in a Talent Management article, which was the subject of my presentation at PMI’s 2015 Talent Management conference in 2015,³ My assertion: the right training can indeed build the foundation for learning. The challenge, as shown in the model at below right, is to move beyond short-term acquisition of facts and knowledge; **minding the gap**, as it was. This is an important step to understand, because the greatest benefits come from the *application* items on the model, Skill: Attitudes, Competence, and Performance.



Note the two axes in the model. The vertical axis, *Transfer Difficulty*, reflects how hard the Talent is to transfer. On the horizontal axis, the items to the left of the gap between Knowledge and Skill have very little *Business Performance Impact*.

Readers who are involved with Learning will recognize some of the higher levels on the chart. For example, levels 3, 2 and 1 reflect the familiar ASK items. These are the Attitudes, Skills, and Knowledge, the focus of effective learning. For those who are familiar with Bloom’s Taxonomy (the 2001 version is

¹ We presented about our use of Risk data, information, and knowledge as the key to Project Intelligence at the 2005 IPMA World Congress, in India. Here is a link to the paper: [Risk Management: Key to Project Intelligence](#).

² From my Taxonomy of Data to the Intelligence Progression, in my blog post, [Does Knowledge Want To Be Managed?](#)

³ My article, [Acquiring, Developing, and Retaining Project Talent](#), shows the progression from knowledge to performance.

more relevant for Adult learners), it builds upon the ASK items, adds measures, and moves into aspects of true learning (Knowledge Management). Finally, the model evokes Kirkpatrick's Class Evaluation method, which progresses from classroom "smile sheets, through on-the-job application, to Performance; reflecting levels 1-5. The resulting model spans from raw data to business performance, and provides a roadmap for talent development. This is the ultimate Knowledgebase for increased project performance. It adds practice intelligence, not artificial intelligence, to your talent search.

Example 5: Machine Learning and Sentient Systems

These most-advanced types of AI have few complete examples, despite today's exciting innovations such as autonomous autos, and robotic physicians. Once again, my examples refer to experiences and applications I have seen while exploring the current status and future of project management.

In 2007, Project Management Institute asked me to contribute a chapter to a book under development, *Project Management Circa 2025*. I wrote Chapter 9, Visions for the PM Software Industry. To do so, I engaged the leaders of the most-important global PM software providers, plus industry experts, to share their key insights to our future. From those insights, plus my own impressions, I identified a wide range of advancements we could expect over the following several decades. One example: that your interpersonal skills should continue to be your greatest strength (but still, keep your technical skills current). We also predicted that leadership skills, PM Competence, and PM Performance would be your greatest strengths for the next 30 years. In addition, importantly, I identified a concern: That the leading edge of PM organizations is adopting newer technologies far faster than the laggards: **the results gap widens**.

Here are examples from our chapter that show the potential for Machine learning and Sentient systems:

- *Capture & Reuse of Project Knowledge*: A role of project knowledge broker emerges, as enterprising salespersons bring together the knowledge buyer and seller—and profit from it. See page 6 of our online chapter, as referenced in the footnote.
- Gloria Gery's Performance Support Systems, including an updated scenario: When you are awaiting information or approvals from others, your IntellAgent interacts with theirs to deliver what you need to complete your efforts. In addition, because project work relies so much on research and innovation, your IntellAgent doubles your results in half the time.
- *IntellAgent-Facilitated Meetings Improve Effectiveness*: Using recorded knowledge and processes, your IntellAgent learns how to improve your processes, interactions, and the results of each session. It adds (and researches) new topic processes as meetings evolve them.
- *Socket To Me and the Wisdom Tooth*: Now the differentiator between enterprises and between PM practitioners is not their years of training and knowledge, but their ability to harness, reuse and apply the encapsulated intelligence of others.

A Summary

These examples show application of early-and-primitive artificial intelligence, to later, and much more innovative (and complex-to-implement) true artificial intelligence. And, there is much more to come, over time as we learn to harness the potential (and to use it with REAL intelligence).

And now, our responses to those three intriguing questions!

Spring's Questions, and my Responses

1) What is the impact of AI on the profession of project management (benefits and challenges)?

A cautionary statement: These impacts will only occur for the individuals and organizations that select, prepare and implement AI innovations properly. Even then, you face organizational change risks.

a. Benefits for the profession

- Higher levels of success, greater support from upper management and stakeholders.
- Increased job satisfaction, with less burnout.
- Much greater credibility with executives, managers, and other key stakeholders.

b. Challenges for the profession

- Failure to re-use project knowledge, risk intellibases, re-usable plans, and business deliverables.
- Institutionalizing interpersonal and leadership skills, as the professional associations now urge.
- Must move beyond explicit knowledge, to tacit knowledge, competence, and measured results.

c. Benefits for executives, managers, and other stakeholders

- Greater, faster return on investment in well-managed initiatives.
- Higher retention rates for key talent.
- Faster promotion and upward mobility, in project-centered enterprises.

d. Challenges for executives, managers, and other stakeholders

- Failure to manage projects and programs differently than ongoing processes; the mentality by some, of 'starving the project,' only produces failed projects, late, over-budget, and incomplete.
- Failing to trust and reward project managers and teams will blunt the benefits otherwise offered.
- Failing to move the enterprise from technology adoption laggards to leaders (not applying real intelligence in managing) will cripple project and program efforts.

2) What are the top / must-have qualities for PMs to excel in the AI era?

- * Strategic linkage; leadership and interpersonal skills
- * Learning to re-use, rather than always invent new
- * Overcoming the 'not invented here' syndrome
- * Managing upward
- * Sense of humor
- * Convincing
- * Trustworthy
- * Proven performance competence, far beyond exam-focused explicit knowledge (the easiest type); otherwise, we cannot manage the machines! Just remember Hal 9000, in 2001 A Space Odyssey!

3) What is the suitable leadership style for the AI era?

My long-term position on this question is that many different project leadership styles can work well, when applied appropriately to the situation. But your style must be a) true to your personal style of the leader (i.e., you can never be a clone of your manager), and b) true to the situations of the initiative.

That said, in the late 1980s, I funded an instrument that assessed a project manager/team member/ manager personal styles inventory. It covered Motivational Needs, Thinking Style, Behavioral Style, and Leadership Style, we narrowed the areas of importance for Leadership Style down to five:

1. Bias for Action; better to act and recover, than to study a situation to death. This might be Agile.

2. Envisioning; establishing a shared vision of the benefits of the project, and sharing the results.
3. Risk-taking; while not blind to risks, but intelligently dealing with them, focusing on deep understanding of the current risk situation, and its decision consequences.
4. High-communicating; rapid communication of the right information, filtering of the unneeded.
5. Empowering; causing others to feel excited and having the power to succeed in all assignments.

In addition, your AI leadership style will benefit, in most project situations, from applying these traits:

- Strategic
- Managing upward
- Teambuilder
- Flexibility
- Listening
- Innovative
- Sustainability-savvy
- Asking the right questions

In Closing

Thank you, Spring, for the opportunity to weigh in with my opinions about Artificial Intelligence and Project Management!

About Our Interviewer



Yu Yanjuan, Beijing China

Yu Yanjuan (English name: Spring), Bachelor's Degree, graduated from the English Department of Beijing International Studies University (BISU) in China. She is now an English-language journalist and editor working for Project Management Review (PMR) Magazine and website.

She has interviewed over sixty top experts in the field of project management. Before joining PMR, she once worked as a journalist and editor for other media platforms in China. She has also worked part-time as an English teacher in training centers in Beijing.

Beginning in January 2020, Spring also serves as an international correspondent for the PM World Journal. For work contact, she can be reached via email yuyanjuan2005@163.com or LinkedIn <https://www.linkedin.com/in/yanjuanyu-76b280151/>.

About Stacy

Stacy A. Goff, the *PM Performance Coach*[™], has coached and inspired tens of thousands of project and program managers, and hundreds of organizations, on five continents, for over forty years. A Project Management practitioner since 1970 and consultant since 1982, he has also been a strong contributor to professional organizations such as IPMA® and PMI® since 1983.

He is a co-founder and past-president of IPMA-USA, and 2011-2014 Vice President of Marketing & Events for IPMA, the International Project Management Association. In September, 2015, he was named an IPMA Honorary Fellow.

Goff's interest in project competence and performance began with establishing a PM Competency Center for a nuclear power plant in the early 1980s. It continued with international engagements during the 1980s and 90s as he helped organizations assess and improve their project and program performance. Today, he coaches, speaks and performs keynote speeches at major project-related events. And, he continues to pursue his interest in individual, project team, organization, and national and international PM performance.



Mr. Goff brings a results-oriented approach to Project Management coaching, consulting, and training. His insight for the needed PM Competences, and his delivery of effective training translate to improved project performance. In his working life, he combines his Project experience with sensitivity for the interpersonal skills areas—the human aspects of projects.

In his papers, presentations, workshops or in consulting, he combines his project experience with strategic linkage for all projects and programs. His insights and experience have provided competitive advantage for his clients for over 40 years. His business result: measurably increased **PM Performance**.

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