

# Guide

## SDM Core Integrated Team Project

revised 25 September 2023

### OVERVIEW

The integrated team project is part of a nine-month core course on the foundations of systems architecture (SA), systems engineering (SE) and project management (PM). In these projects, teams apply systems thinking and methods on key decisions for the design and implementation of particular technologically enabled system. These Team Projects run for 4 months, from Jan to May.

**Industry and government organizations are encouraged as SDM Partners to prepare a proposal to pitch, and to support these projects.** The proposal should consider a problem rather than an anticipated solution. Not all proposals are selected. Students vote on preferred topics, from which teams of 4 to 5 are formed.

### Types of Projects

Projects must involve a technical system to be designed and developed; however, there is flexibility in the type of projects. SDM instructors will work with Partners to refine proposals. Options include:

- Bringing a promising new cutting-edge technology from the lab to market
- Enhancing an existing product by infusing one or more new technologies
- Proposing a next-generation architecture or assessing threats to the dominant design

Projects should be non-trivial and involve a complex **technical** system with significant societal, technological, or programmatic challenges. Projects should have a non-obvious answer: projects supporting existing designs with no decision at stake will be less likely to be adopted. Consulting projects, business models, organizational design, process improvement, and portfolio pruning projects are not acceptable proposals.

If data is core to the project, data shall be supplied by the Partner, pre-packaged, and available for student team use in a university course setting, by Jan. 9, 2024. *The team projects are part of a course, and thus are not sponsored research.* It is not appropriate to require a contract, specific deliverable or tool, nor to require any agreement (e.g. NDA).

### Expected Minimum Time Commitment

Partners designate one “mentor” as the point of contact within the company, who will both provide regular feedback, as well as coordinate any other internal company resources and data in support of the project.

Each team will coordinate with MIT and SDM’s Partner mentors for regular dialogue and guidance.

Partners are expected to spend a minimum of 28 hours supporting the project:

- 8 hours to pitch of project on January 8, 2024, and (if selected) initial meetings with students the week of Jan 8-12, 2024.
- 1 hour per week supporting students during the term (16 hours total)
- 4 hours to during final presentations for feedback (May 14-15, 2024)
- 1 hour for Company final briefing (May or June 2024)

Students are expected to spend approximately half of their out of class time (5 hours each week) on

team project activities.

### Team Project – MIT Presentation Events (May 13 and 14, 2024)

By the end of the semester, each team will deliver; (1) a presentation and (2) executive memo that summarize their results and recommendations. The presentation from each team will exhibit the framing, design, analysis, and future recommendations for their system including architecture, systems engineering, and project management. A schedule and evaluation criteria for the projects are shown below.

### Team Project – Partner Final Briefing (May or June 2023)

Since the final project presentations are addressed to MIT's faculty, Partners set up a separate in-depth briefing by students at the conclusion in May or June 2024. This will allow an in-depth debrief between the MIT team and Partners.

## General Guidance

### Guidance for Student Teams

- Cover context, systems architecture, systems engineering and program management aspects of a system, resulting in in-depth analysis, insights, and executive level recommendations.
- Explain your team's choice to select and apply certain SA, SE, or PM methods and tools.
  - Touch on all three core areas and how the design choices made across SA, SE, and PM relate to one another.
  - Project management content shall not emphasize the team's work during the semester, but rather plans for implementation of the system in future phases.
- Balance experience with new thinking, methods and techniques introduced in the course.
  - Methods may be different from approaches used in specific companies or industries, yet exploration of differentiated approaches is an expectation for this project.

### Guidance for Partners

The primary role of the Partner is to **provide real-world context, review progress as requested by students, and advise on the relevance of the team's focus -- the "voice of the challenge."**

- Projects are selected, managed, and ultimately delivered by the students, thus the *students have the prerogative to choose* where to focus, how to evolve, and what to deliver. We ask that Partners remain flexible as students explore, even if their efforts diverge from the expectations of the Partner.
- If data is core to the project, data shall be supplied by the Partner, pre-packaged, and available for student team use in a university course setting, by Jan. 9, 2024.
- In a university, students may choose an unexpected path, make errors, or simply do a mediocre job earning a lower grade. This academic liberty is important to promote ownership and motivated learning.
- Overall, the experience of past Partners has been very positive, including regular interaction with MIT students, insights from different ways of framing the challenge, and access to the latest techniques in SA, SE, and PM. The *team project can stimulate follow-on* internships and Partnered research with a deeper dive and research deliverables.

### Student Team Coordination with Partners

Be sure very early to agree on a regular coordination schedule and style between the Partner and student Team. A minimum bi-weekly communication is recommended, as well as 1 or 2 major Partner reviews of intermediate progress during the semester.

There may be tension between assignments and the nature of the challenge or Partner expectations. If these tensions surface, please discuss with TAs and faculty how the assignment might be leveraged to close this gap.

## 2023-2023 Schedule

<p>Nov 2023</p>	<ol style="list-style-type: none"> <li>1. Candidate Partners submit a <b>draft of their proposed</b> challenge topics by Dec. 2, 2023. The 1 pager summary is based on a common format (see PowerPoint slide template and examples).</li> <li>2. MIT SDM core instructors provide feedback for refinement by Dec 16th. The final feedback categories are; (a) Accepted &amp; Invited to Pitch in January, (b) Conditional acceptance pending the inclusion of MIT's feedback, (c) Rejected.</li> <li>3. Students receive a list of topics in December, and access to 1-page summaries at the start of January.</li> </ol>
<p><i>Intensive Week</i> Jan 8 - 12, 2024</p>	<p><b>1/8 (Mon): Integrated Project Showcase</b></p> <ul style="list-style-type: none"> <li>• AM: Students present technology posters from assignment OS6 in the fall, exhibiting emerging technologies from across MIT.</li> <li>• PM: Proposals presented* by Partners in 6-min pitches. Students vote on top choices. <i>* in person pitches by Partners are recommended and more likely effective, but arrangement can be made for online pitches.</i></li> </ul> <p><b>1/9 (Tue):</b> Teams formed and kick-off of Integrated Projects. <b>Initial meetings</b> with Partners and refinement of project challenges and definitions. <b>Daily workshops</b> for newly formed student teams (week of Jan 8-12, 2024). <b>Design Challenge 3:</b> Launch Teams, Frame Problem, Establish Charter, Communicate approach to peers and instructor team. <b>1/12(Fri): Teams deliver initial framing of problem after week of workshops.</b></p>
<p>Feb 5 – May 14, 2024</p>	<p><b>Spring Term</b></p> <ul style="list-style-type: none"> <li>• Team project work is ongoing through the semester.</li> <li>• “OS” assignments are applied to the team’s project topic.</li> <li>• Meetings / check-ins with mentors a few times each month.</li> <li>• TA is assigned to each team for support throughout the semester.</li> </ul> <p><b>Systems Argument, Plan and Pitch Readiness</b></p> <ul style="list-style-type: none"> <li>• Mid-course reviews on April 1</li> <li>• Argument drafted by May 2 for rehearsals</li> </ul>
<p>May 13 - 14, 2024</p>	<p><b>Integrated Project Final Presentations</b> Student Teams submit an ungraded poster by May 10 @ 11pm, to allow for printing). <b>Presentation final version to be submitted by May 12 @ 11pm EDT</b> <b>Executive Memo to be submitted by May 16 @ 11pm EDT.</b></p> <ul style="list-style-type: none"> <li>• The <b>final presentations will be grouped into several sessions</b> of up to 2 hours.</li> <li>• Teams will <b>deliver 10 to 12-minute presentations followed by a short Q&amp;A.</b> <ol style="list-style-type: none"> <li>1. Students are required to attend only the session in which they present.</li> <li>2. Teams will be scheduled to avoid conflict with their other classes.</li> <li>3. Students are encouraged to attend presentations and forums, to view peer team results, to celebrate and to learn from one another.</li> </ol> </li> <li>• A final panel with the instruction team will be held on May 14 in the afternoon.</li> <li>• A celebration will be held at the MIT Sailing Pavilion on May 14 15:00 – 17:00.</li> </ul>

## Team Deliverables

### Design Challenge 3 (Jan 9 - 12, 2024)

Design Challenge 3 (DC3) is based on an intense set of workshops over 4 days following the formation of teams for the spring project. DC3 concludes on January 13 with the following deliverables:

1. Submit a validated Charter\* and Project Concept for your Team (3 pages or less)
  - a. Frames the technical problem, system and project boundaries, potential value, and authorizes the team to plan and proceed.
  - b. Focuses on the next 4 months (Jan – May 2024) as the initial phase of a full systems development project.
  - c. Includes team roles and teamwork approach including coordination agreement.

### Final Deliverables for week of May 13, 2024

- Final project **presentation**: PowerPoint, also submitted to Canvas as PDF, length 10 minutes including questions.
- 5-page **executive memo** (Word document, submitted to Canvas as PDF) that summarizes results and recommendations. Appendices are acceptable but will not be considered for evaluation.
- A poster summarizing the content from the presentation and memo, for the poster session on May 13. The poster session is informal and the poster is ungraded.

### Presentation

- Audience includes SDM instructors, peers and Partner mentors.
- Emphasize problem framing, options, evaluating value, and recommendation options. What is the primary value that it delivers, to whom, and how is the value measured?
- Describe the team's analytic and synthesis strategy. Therefore, what is excluded from the recommendation and why?
- At most two of the team members must be involved in synchronous delivery of the presentation online. We encourage teams to involve all team members in preparation, and that those who have presented less often in the past be out front.
- At most 3 minutes of pre-recorded video/animation may be included.
- *Any detailed figures (such as those from OS) should be included if a pattern is discernable and tied to a key insight. Detail for detail's sake without a role in the analysis and argument of the project is discouraged.*

### Executive Memo

- Audience is the Partner executives, with recognition of other key stakeholders
- The memo is a written argument that leads to a call for action, which frames the problem and guides executives to support the proposal. Relevant deeply held assumptions and conventional biases should be exposed. The memo should be compelling integration of the detailed work completed throughout the semester.