



Title

“FLOAT!” – A Construction Project Scheduling Game

Author

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Survey

This game was developed by Dr. Gunnar Lucko at Catholic University of America for the Greater Washington ACE affiliate under research for the National Science Foundation. Part of the research is to continue measuring how much positive contribution the board game makes when ACE teams use it. Feedback is anonymous and will be added to the research database. The Start and End Surveys were approved by the Institutional Review Board of the university on October 6, 2016 as required by U.S. Federal law.

For this research evaluation, please have each student fill in the Start Survey before playing the game and the End Survey afterward. Thank you! Kindly mail all surveys to:

*Dr. Gunnar Lucko
Department of Civil Engineering
Catholic University of America
620 Michigan Avenue NE
Washington, DC 20064*

Discipline Construction Management / Scheduling

Educational Goals

- Gain an understanding of managing time on a construction project.
- Learn to cooperate with other participants in a team for mutual benefit.
- Distinguish different phases and activities on real-world projects.
- Balance careful planning with flexibility to adjust to new situations.
- Understand the importance of being “on schedule and within budget.”





Discussion

Before starting the game, the mentor or teacher should lead a short discussion about how students manage their own schedules for classes and extracurricular activities: Day planners or calendars help tracking due dates. Subway or bus timetables are consulted by the students to commute to and from school. Explain that companies (contractors) face similar challenges when planning and controlling their time-sensitive project work.

Time

Preparation

15 minutes Print color sheets and cut out all money/event cards before game

Actual Game

15 minutes Explanation/demonstration and a few practice steps

1 hour One complete game consisting of 3 phases

Materials

Each team (student group) and mentor/teacher (for explanation/demonstration) require:

- 1 complete color printout, including: Rules, Board, Capital, Checklist, Activity and Event Cards. These materials can be found at the end of this printout. (The mentor should cut out all cards before game and hold them together with paper clips.)
- 1 six-sided die (Bags of dice can be bought cheaply at game or crafts supply stores.)
- 1 token *per student* (e.g., a small figure) to indicate each student's current activity
- 1 pencil *per student* to update Checklist and Capital, and answer the two surveys
- 1 Start Survey and End Survey *per student*

Description

"FLOAT!" follows the approach of so-called German-style board games, which often are characterized by a commercial theme, need for some strategic thinking, non-elimination of players (i.e., all will participate until the end), and rules that contain chance events.

The game is designed to teach students how flexibility in a schedule is a valuable but limited resource, which should be used carefully to benefit the project. The objective of the game is to complete a sequence of 3 construction stages, each of which comprises some unique activities. Within each phase, simple sequential activity relationships exist. The game simulates the importance of remaining "on schedule and within budget."

→ *The mentor asks students to fill in the Start Survey and keep it until the game ends.*

Each player forms a subcontractor company (with a letter as its name and a token to move across the board) with initial capital of \$10. Each company will build parts of a common project. Each player draws activity cards for just the current phase, randomly receiving either one or two cards. (This is realistic, because companies do different amounts of work and are active more or less throughout a project.) In other words, each player is a subcontractor for exactly these activities. They must be done throughout the building, which means visiting all zones of the game board to perform the work there.





Each activity has a unique duration that is randomized by the player rolling the die and turning said activity card to show the number of remaining days on its top (as seen from the player). In other words, the way a square card is turned shows the remaining time for that activity. As a square card has four sides (including 0 days), the 6 possible dice roll outcomes are translated into remaining days: 1-2 dots = 1 day; 3-4 = 2 days; 5-6 = 3 days. This is the planned duration (which may increase or decrease due to events).

For the actual duration, the player rolls the die and with as many steps as dice dots tries to move the token across all zones on the board in one continuous move. Moves cannot go diagonally, but can go left-right or forward-backward as many times as the dice dots allow and the player wants. Each visited zone is recorded as completed in the checklist. After each round – or day – of the game, the cards are turned to have one less day.

In the first and third phases – subsurface and finishes – all token moves begin in the storage yard, from where their steps are counted. But in the second phase – structure – a tower crane is available, which allows jumping from it directly to any zone. This crane gives players more opportunities to move along the best individual work path without needing superfluous steps or getting into each other's way. Having the crane simulates how real projects benefit greatly from having a crane to lift materials to any location.

The current player receives a monetary bonus for each day of float that remains when the individual activity is completed. Such remaining float means that this activity is ahead of schedule, and such good performance is rewarded. Conversely, if an activity does not finish within the allotted time, this subcontractor has 'failed' and is replaced by the then most successful (here richest) player, who gets paid a fee and time extension to take on this extra work. This is because the entire project can only advance to the next phase and eventually be finished when all activities are been completed, even if another subcontractor has to take over. This scenario also happens in the real world.

End

The game ends after all activities of the 3 phases of the project are completed. Players total the amount of their capital. The success of each player is individual, but is only possible by collaborating with all of other players, both enabling them and depending on them. To focus on the schedule, the game does not model routine monthly payments.

After the game ends, the mentor/teacher can lead a discussion about how following a work plan, but remaining flexible, is important for a real construction project. Ask what lessons students have learned. Explain that cooperating is typically best for all project participants, who are 'in it together,' instead of working against each other. Discuss how companies/subcontractors must carefully manage their project work to finish on time.

→ *The teacher asks the students to fill in the End Survey and collects both surveys.*

Rules

See detailed Rules Sheet.





Float

This board game simulates float within a construction project schedule in a unique way. ‘Float’ is defined as having flexibility within the duration of an activity in a schedule. An activity that has zero float is deemed ‘critical’ (or non-flexible) for the project. The value of such float lies in giving an activity the ability to absorb delays in the activity itself by extending its duration but without impacting other activities or the entire project. In other words, activities having float are desirable, because float prevents a ripple effect that would pass from a delayed activity to subsequent ones, which hampers a project.

Despite the important role of float in scheduling, construction theory and practice have tended to focus on the absence of float (which is called criticality). The term criticality indicates that all critical activities should have priority for a busy project manager, while non-critical activities (i.e., those with some float) can be worried about somewhat less. The research that underlies this game advocates for a more balanced management philosophy – all activities in a schedule matter, because they all belong to one project.

As a special feature in the game, students are able to trade their float days among each other. In other words, the game reflects that flexibility can have a real monetary value. Admittedly, trading float is not yet a widespread industry practice, but should certainly become accepted as a good strategy. The reason is simple – trading float is a positive reinforcement of good performance as follows: If extra days in the schedule are worth actual dollars, then early completion of a project task or activity is incentivized, while underperforming contractors still receive an ability to recover – albeit at a cost to them – from their delays. A project would turn into a ‘marketplace of opportunity’ where good contractors can generate a reward by earning extra profit from less good performers.

The creator of this board game, Dr. Lucko, is currently drafting industry implementation guidelines and contract language to support this new approach. Eventually, it is hoped that this will lead to planning and controlling projects in such a way that companies will work proactively and achieve on-time performance, because delays sadly continue to be a pervasive problem in the construction industry that leads to costly legal disputes.

Sample Game Rounds

Players perform their individual moves one after the other within each day and repeat these steps (see ‘How to Play One Day’ in the rules). To illustrate the rules, sample rounds of this board game are described below for a fictitious student called Mary.

Day	Description	Record
0	→ Mary fills in the Start Survey and keeps it for now.	N/A
0	To set up, Mary and other players place the board (with their tokens on storage), capital, and checklist onto the table between them, as well as the two piles of shuffled subsurface and event cards. They have a pen.	N/A





0	Mary and other players go clockwise around the table, each taking one subsurface card until the pile is gone. All players place these cards open in front of them. Mary happens to get two cards, Mobilize and Form Slab. As she should not have two cards of the same sequence, she randomly picks a card from the player on her left – Excavate.	N/A
1	Mary starts the game, because she has a Sequence I card – Mobilize. She rolls the die and gets 4 dots, so she turns the Mobilize card so that ‘2 days remain’ faces up. Other players who have Sequence I cards do the same. Players without this type of card simply wait.	N/A
1	Mary takes an event card – Mild Delay. She decides to spend \$1 from her initial capital (recording ‘-\$1’) to keep her card at 2 days remaining and ‘accelerate’ work on Mobilize so as not to fall behind. She places the Event card face down. This early in the game, no float is needed.	Mary \$9
1	Mary rolls the die again and gets 3 dots. She moves her token from storage via Zone 2 and Zone 5 to Zone 4, where she leaves it. She takes the pen and crosses these zones for Mobilize off the checklist.	Mary Zones 2, 5, 4
1	Mary turns down Mobilize to ‘1 day remains’ facing up to finish her actions today and gives the die clockwise to the player on her left.	N/A
...	<Further steps omitted for brevity.>	...
2	Mary still needs to finish Mobilize, which was only half completed on Day 1. She takes an Event card – On-Time Complete -- so there will be no problems in working on Mobilize today. She rolls the die and gets 5 dots, which should be enough steps to finish Mobilize in all zones. She moves her token from Zone 4 via Zones 3, 1, 3, 4 to Zone 6. She takes the pen and crosses these zones for Mobilize off the checklist, turns the Mobilize card face down, and finally moves her token back to storage.	Mary Zones 3, 1, 6
2	Mary turns Mobilize to ‘0 days remain’ facing up to finish her actions today and gives the die clockwise to the player on her left. While she did not earn a bonus for early completion – she finished Mobilize in exactly the time she had – at least she did not need to buy float yet.	N/A
...	<Further steps omitted for brevity.>	...
4	During the previous steps, other players have finished more Sequence I cards in Zones 3 and 5. It is Mary’s turn. She can start Excavate, which is Sequence II. She rolls the die and gets 6 dots to turn Excavate to ‘3 days remain’. She draws an Event card – On-Time Complete.	N/A
4	Mary rolls the die again and gets 3 dots. She moves her token from storage via Zone 4 to Zone 3 and back to Zone 4. But she does not yet have enough steps to reach Zone 5. But Zone 4 is still free so that her token can land there. She crosses Excavate Zone 3 off the checklist, turns Mobilize to ‘2 days remain’, and passes the die to the left.	Mary Zone 3
...	<Further steps omitted for brevity.>	...
TBA	Mary checks her capital sheet and finds that she has come in second in terms of profit. The teacher discusses the results of this team project.	TBA
N/A	→ Mary fills in the End Survey. The teacher collects the two surveys.	N/A





THE CATHOLIC UNIVERSITY OF AMERICA
DEPARTMENT OF CIVIL ENGINEERING

620 Michigan Avenue NE
Washington, DC 20064
Tel: (202) 319-5163, Fax: (202) 319-6677

September 8, 2016

Dear ACE Parent or Guardian,

As you know, your son/daughter is currently participating in the ACE Mentor Program, for which I am a mentor at his/her high school.

I am currently conducting research, which is sponsored by the National Science Foundation, on how to better prevent schedule delays. As part of this overall research, I will share insights with the ACE group.

Specifically, I will lead a discussion with the students about what types of risks exist (e.g. bad weather, which may delay work on the construction site) and what companies can do to protect against such risks. Then, I will let student play an educational board game about risks on construction projects that I have designed (with dice and cards, similar to “Monopoly”).

Before and after the game, I plan to give your son/daughter a short paper survey that asks some brief questions about existing work and computer experience, general opinions about work habits and simple skills (for example, using checklists).

If you have any questions, please contact me any time at phone: 202-319-4381 or email lucko@cua.edu.
 Dr. Gunnar Lucko, Department of Civil Engineering, 620 Michigan Avenue NE, Washington, DC 20064.

*Please sign the attached sheet to allow me to give the survey to your son/daughter,
 and ask him/her to bring the sheet to the next ACE session.*

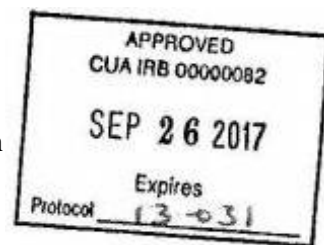
Thank you in advance for allowing him/her to participate in the game and survey.

Yours sincerely,

Gunnar Lucko, Ph.D.
 Professor and Director
 Construction Engineering and Management

Parent / Guardian Informed Consent

Title of Project: Educational Board Game about Risk Management in Construction
Investigator: Dr. Gunnar Lucko, Catholic University of America



1. Purpose

This research measures what your son/daughter knows (or is curious about) how professionals in the construction industry manage risk so that they achieve on-time, on-budget, and safe projects.

2. Procedure

This research will use an educational board game (similar to “Monopoly”) and a paper survey before and after the game, which will ask some brief questions about existing work and computer experience, general opinions about work habits and simple skills (for example, using checklists). The total time has been tested to be approximately 15 minutes to complete all survey questions.

3. Risks

No risk has been identified that could be caused by participating in this research.

4. Benefits

His/her participation will help better understand how to interest students in the importance of learning about preventing delays.

5. Anonymity

No names will be asked, and all answers will be kept strictly confidential and anonymous.

6. Approval

This project has been reviewed and approved by the Institutional Review Board of Catholic University of America as is required under U.S. law 45 CFR 46.101 subsection 2. (b) 2.

“I give my permission that my son/daughter _____ (*insert name*) can voluntarily participate in the game and surveys. I have read and understand this Informed Consent. I understand that my son or daughter can decide at any time to not take the survey.”

Name in block letters

Signature

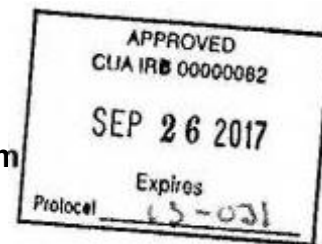
Date

If you have any questions, please contact: Phone 202-319-4381 or email lucko@cua.edu or mail address Dr. Gunnar Lucko, Department of Civil Engineering, 620 Michigan Avenue NE, Washington, DC 20064.



The Catholic University of America
 Department of Civil Engineering
 Construction Engineering and Management Program

ACE Mentor Program of Greater Washington



Student Assent

You will receive two brief anonymous surveys about your experience and skills, before and after the game. The university has approved using them.

“I certify that I voluntarily take this survey. I have been informed and understand that there is no expected risk from my participation.”

Name in block letters

Signature

Date

Current High School Level Freshman (1st year) Sophomore (2nd year)
 Junior (3rd year) Senior (4th year)

Have you taken any engineering-related classes so far? Please list them:

In ACE since Spring Fall Year _____

The Catholic University of America
Department of Civil Engineering
Construction Engineering and Management Program

ACE Mentor Program of Greater Washington

Questions before Scheduling Session

Part 1: Your Experience

Please honestly list any work experience that you have (if not, leave blank).

Year _____ #___ Months	Type of business: _____
<input type="checkbox"/> Served customers	<input type="checkbox"/> Solved problems
<input type="checkbox"/> Planned operations	<input type="checkbox"/> Handled money
<input type="checkbox"/> Supervised staff	<input type="checkbox"/> Scheduled shifts
<input type="checkbox"/> Handled supplies	<input type="checkbox"/> (please add) _____
Year _____ #___ Months	Type of business: _____
<input type="checkbox"/> Served customers	<input type="checkbox"/> Solves problems
<input type="checkbox"/> Planned operations	<input type="checkbox"/> Handled money
<input type="checkbox"/> Supervised staff	<input type="checkbox"/> Scheduled shifts
<input type="checkbox"/> Handled supplies	<input type="checkbox"/> (please add) _____
Year _____ #___ Months	Type of business: _____
<input type="checkbox"/> Served customers	<input type="checkbox"/> Solved problems
<input type="checkbox"/> Planned operations	<input type="checkbox"/> Handled money
<input type="checkbox"/> Supervised staff	<input type="checkbox"/> Scheduled shifts
<input type="checkbox"/> Handled supplies	<input type="checkbox"/> (please add) _____

Please honestly answer the following questions (one checkmark per item).

Have you ever visited a construction site?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you ever watched a construction site for a while?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you know anybody who works on a construction site?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

NEXT PAGE →

Part 2: Your Computer Skills

Please honestly indicate how familiar you are (one checkmark per item).

1. General Software	Very familiar	A bit familiar	A bit unfamiliar	Very unfamiliar
1.1 Microsoft Word	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Microsoft Excel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Microsoft PowerPoint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 Microsoft Access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 AutoCAD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6 Revit (CAD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.7 SketchUp (CAD)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8 (please add) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Computer Programming	Very familiar	A bit familiar	A bit unfamiliar	Very unfamiliar
2.1 C++	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 JAVA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 HTML	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Visual Basic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 (please add) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Construction Management	Very familiar	A bit familiar	A bit unfamiliar	Very unfamiliar
3.1 Microsoft Project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2 Primavera Project Planner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3 SureTrak (scheduling)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4 Timberline (cost estimating)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5 (please add) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Other Skills (please add)	Very familiar	A bit familiar	A bit unfamiliar	Very unfamiliar
4.1 _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2 _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3 _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4 _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5 _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

NEXT PAGE →

Part 3: Management

Please honestly indicate how much you agree (one checkmark per item).

1. Your Opinion	Agree strongly	Agree a bit	Disagree a bit	Disagree strongly
1.1 "I am curious what managers do."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 "I am confused if things don't work."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 "I enjoy working with other people."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 "I tend to be an organized person."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 "I try to do important things early."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6 "I feel that small details do matter."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.7 "I can present thoughts logically."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8 "I handle difficult situations well."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please honestly indicate how familiar you are (one checkmark per item).

2. Your Skills	Very familiar	A bit familiar	A bit unfamiliar	Very unfamiliar
2.1 Ask questions to understand things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Think ahead to not cause problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Use "checklists" to not forget things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Check written work to catch errors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Sort my things to do by importance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.6 Understand how often things happen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.7 Have new plan if old does not work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.8 Know how important each thing is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**STOP HERE
ENJOY THE GAME**

**The Catholic University of America
Department of Civil Engineering
Construction Engineering and Management Program**

ACE Mentor Program of Greater Washington

Questions after Scheduling Session

Please honestly indicate how much you agree (one checkmark per item).

1. Your Opinion	Agree strongly	Agree a bit	Disagree a bit	Disagree strongly
1.1 "I am curious what managers do."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 "I am confused if things don't work."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 "I enjoy working with other people."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 "I tend to be an organized person."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 "I try to do important things early."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6 "I feel that small details do matter."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.7 "I can present thoughts logically."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8 "I handle difficult situations well."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What have you learned in today's session on scheduling?

What is the thing that you liked best about today's session?

What is the thing that you liked least about today's session?

Is there any question that you still would like to get answered?

FLOAT!

A Construction Project Scheduling Game



Rules



Goal

Players including you collaborate on a single project (a small multi-floor building) to finish their own activities, each of which has a planned duration, and gain rewards for good performance. But remember that you also depend on other players (companies) to finish your own work.

The game has three phases of construction: *Subsurface*, *Structure*, *Finishes*. In each phase you finish one or two *activities*. Your token must visit all *zones* so that your crew works in each (which is recorded in *checklist*).

Your strategy is to find a work path that does not interfere with other players on this construction site. You may try to buy or sell leftover days— **float** – to finish your work or help other players.



Elements (for up to 6 players)

Cards: *Activities* (in 3 phases, for small or big project – see following Expansion Pack); *Events* (12 different one); *Board* with 6 *zones* where work occurs, *storage*, *crane*

Objects: *Die* (1); *Tokens* (6 small objects as crew, e.g., wood figure/key/etc.); *Checklist*; *Capital* sheet (Idea: Instead of sheet, teams may use real coins, e.g., pennies); pen.



Project Size

3-6 players make up one team that uses one game set (this printout). Start learning the game by using only the *small project* cards. As an option, experienced players who desire a longer and more challenging game can add the *big project* cards (see the *Expansion Pack* on pages 19-21).



Mobilization

Place *board* in the middle of table. Its *crane* will only be used during the *Structure* phase. Going clockwise around table, each player picks a unique company name (use letters A-F) and 1 *token*. Place all *tokens* onto *storage*. One player volunteers to keep *checklist* updated after each day of the game, and another player will update *capital* sheet. Shuffle the *Subsurface* and Event cards and place them face down onto two piles (keep *Structure* and *Finishes* cards for later phases):



Activities and Sequence

All players share one *die*. Going clockwise around the table, each player picks one *activity* card until all cards of this phase are allocated. Each player will have either one or two cards – both are ok. If any player has two *activities* with the same sequence number (e.g. I-I or II-II or III-III), that player should swap one card with a randomly picked one from the next player to the left.

Players must finish all lower sequence *activities* in a *zone*, before any higher sequence *activities* can start in that *zone*. Of course, some *zones* may already start the next sequence *activity* before other *zones*. Simply remember, activities must follow “Sequence I then II then III” in any zone.





How to Play One Day

Take these actions, then give the *die* to next player on your left. Repeat until all phases are finished:

1. Work on activity? If you cannot continue or start any *activity*, simply skip this day. If you still need to finish an ongoing *activity* from yesterday, work on it. But if you have a sequence I card, you can work in any *zone*. If you have a sequence II or III card, see the *checklist* if any *zone* has all sequence I *activities* completed. If so, you can work at least there. To start, roll *die* and turn *activity* to remaining duration (1-2 dots = 1 day; 3-4 = 2 days; 5-6 = 3 days).
2. Take an event card and follow its instructions. Ignore *event* if impossible or negative (i.e. delay if 0 days remain). Then put it aside face down. If the *event* card pile runs out, reshuffle all previously used *event* cards to create a fresh pile from which more *events* can be drawn.
3. Buy float if needed. At least 1 day must remain on current *activity* to work today! If 0 days remain, just say “float!” to buy 1 to 3 extra days, using whatever remaining capital you have. If another player is willing to sell some float for \$1 per day, then you turn your *activity* up and the seller turns one *activity* down by that many float days. If nobody wants to sell, you must skip working today. Players should remember that collaboration is expected and useful, because only if you help others will they also help you.
4. Roll die and move token from storage (crane in **Structure** phase) in one continuous move with as many steps (or less) as *die* has dots. Moves must be straight (no diagonals allowed, but only left-right or forward-backward moves). Place *token* where last step lands. For safety it cannot land on a *zone* with another *token*. Remember: Visiting a zone means working there.
5. If a move does not finish all zones, you will continue *activity* with remaining days tomorrow.
6. If a move finishes all zones, put *token* into *storage*, and turn *activity* face down. Any player who finishes *activity* with remaining float days gets a bonus of \$1 per day.
7. If no days remain to finish activity and no float can be bought, the player with **most** dollars will take over finishing that *activity* and gets paid \$2. *Activity* is turned to 3 days remain.
8. Update records. Record finished *zones* in *checklist* and event fees or bonus in *capital* sheet.
9. To end your current move, turn down current *activity* by 1 day and give *die* to next player.

After last player today, put *events* back into pile and shuffle. After last phase, determine winner!

Acknowledgement:













The Principal Investigator gratefully acknowledges valuable feedback on game playability from Pedro Astudillo Leos, PE (Department of General Services, District of Columbia), undergraduate research assistants Jonathas Sousa Reis and Clara Mariana Katsuragawa, and the Fall 2016 ACE (Architecture, Construction, and Engineering) Mentor Group at Hayfield Secondary School, as well as Dr. Edmund H. Worthy, ACE Director of Education, for editing the game teacher notes. *The support of the National Science Foundation (Grant CMMI-1265989) for portions of the work presented here is gratefully acknowledged. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily represent the views of the National Science Foundation.*






✂ Activities: Cut out all cards.

 0 days remain 	 3 days remain Small Project Subsurface Mobilize <i>Sequence I</i>  1 day remains	 0 days remain 	 3 days remain Small Project Structure Form Slab <i>Sequence I</i>  1 day remains	 0 days remain 	 3 days remain Small Project Finishes Thermal Insulation <i>Sequence I</i>  1 day remains
 0 days remain 	 3 days remain Small Project Subsurface Pile, Sheet, Lagging <i>Sequence I</i>  1 day remains	 0 days remain 	 3 days remain Small Project Structure Post- Tensioning <i>Sequence I</i>  1 day remains	 0 days remain 	 3 days remain Small Project Finishes Electrical Outlets <i>Sequence I</i>  1 day remains
 0 days remain 	 3 days remain Small Project Subsurface Excavate <i>Sequence II</i>  1 day remains	 0 days remain 	 3 days remain Small Project Structure Concrete Slab <i>Sequence II</i>  1 day remains	 0 days remain 	 3 days remain Small Project Finishes Mechanical HVAC <i>Sequence II</i>  1 day remains
 0 days remain 	 3 days remain Small Project Subsurface Form Footing <i>Sequence II</i>  1 day remains	 0 days remain 	 3 days remain Small Project Structure Stairs and Ramps <i>Sequence II</i>  1 day remains	 0 days remain 	 3 days remain Small Project Finishes Plumbing Bathrooms <i>Sequence II</i>  1 day remains
 2 days remain 		 2 days remain 		 2 days remain 	

✂ *Continued.*

 0 days remain  3 days remain Small Project Subsurface 1 day remains Survey <i>Sequence III</i>	 0 days remain  3 days remain Small Project Structure 1 day remains Brick-laying <i>Sequence III</i>	 0 days remain  3 days remain Small Project Finishes 1 day remains Roofing <i>Sequence III</i>
 2 days remain  3 days remain Small Project Subsurface 1 day remains Concrete Footing <i>Sequence III</i>	 2 days remain  3 days remain Small Project Structure 1 day remains Joists and Rafters <i>Sequence III</i>	 2 days remain  3 days remain Small Project Finishes 1 day remains Demobilize <i>Sequence III</i>


✂ *Events: Cut out all cards.*

 Event  Event Contract Change Event All players get 1 more day for current activity	 Event  Event Good Progress Event Turn activity up 1 day OR get \$1	 Event  Event Early Complete Event Get \$2 bonus
 Event  Event On-Time Complete Event Activity went as planned	 Event  Event Mild Delay Event Turn activity down 1 day OR lose \$1	 Event  Event Mild Delay Event Turn activity down 1 day OR lose \$1

✂ *Continued.*

Event	Event	Event
Medium Delay Turn activity down 2 days OR lose \$2	Severe Delay Turn activity to 0 days remain OR lose \$3	Unforeseen Event Skip playing on next day
Event	Event	Event

✂ *Game Board: Cut out this entire board. Do not cut it into small pieces.*

Zone 1	Resource Storage Yard Move <i>token</i> from here in continuous straight move to any <u>adjacent</u> zone	Zone 2
Zone 3	Zone 4	Zone 5
Resource Tower Crane Move <i>token</i> from here to <u>any</u> zone (use only during Structure phase!)	Zone 6	Copyright © 2015  Funded in part by grant CMMI-1265989 (National Science Foundation) Dr. Gunnar Lucko

✂ Capital: Cut out this entire sheet, but do not cut it into small pieces.

CAPITAL: Enter +/- Dollars in boxes below																	Sum
A	\$10																
B	\$10																
C	\$10																
D	\$10																
E	\$10																
F	\$10																

















































✂ Checklist: Cut out this entire list, but do not cut it into small pieces.

CHECKLIST for Small Project: Check off completed							
Phase	Sequence	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
1: Subsurface	I	Mobilize					
		Pile, Sheet, Lagging					
	II	Excavate					
		Form Footing					
	III	Survey					
		Concrete Footing					
2: Structure	I	Form Slab					
		Post-Tensioning					
	II	Concrete Slab					
		Stairs and Ramps					
	III	Bricklaying					
		Joists and Rafters					
3. Finishes	I	Thermal Insulation					
		Electrical Outlets					
	II	Mechanical HVAC					
		Plumbing Bathrooms					
	III	Roofing					
		Demobilize					

✂ *Expansion Pack: For a longer and more interesting game, add these “big project” cards.*

 <p>0 days remain</p> <p>Big Project Subsurface Demolish <i>Sequence I</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Structure Atrium Scaffold <i>Sequence I</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Finishes Glazing <i>Sequence I</i></p> <p>3 days remain</p> 
 <p>0 days remain</p> <p>Big Project Subsurface Clear Site <i>Sequence I</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Structure Erect Steel <i>Sequence I</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Finishes Pave Parking <i>Sequence I</i></p> <p>3 days remain</p> 
 <p>0 days remain</p> <p>Big Project Subsurface Access Ramp <i>Sequence II</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Structure Shore / Reshore <i>Sequence II</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Finishes Install Fountain <i>Sequence II</i></p> <p>3 days remain</p> 
 <p>0 days remain</p> <p>Big Project Subsurface Dewater Well <i>Sequence II</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Structure Garage Annex <i>Sequence II</i></p> <p>3 days remain</p> 	 <p>0 days remain</p> <p>Big Project Finishes Granite Tile <i>Sequence II</i></p> <p>3 days remain</p> 
 <p>2 days remain</p> 	 <p>2 days remain</p> 	 <p>2 days remain</p> 

& Continued.

 0 days remain 	 3 days remain Big Project Subsurface Sewer Pipe <i>Sequence III</i>  1 day remains	 0 days remain 	 3 days remain Big Project Structure Fire- proofing <i>Sequence III</i>  1 day remains	 0 days remain 	 3 days remain Big Project Finishes Custom Paint <i>Sequence III</i>  1 day remains
 2 days remain 	 0 days remain 	 2 days remain 	 0 days remain 	 2 days remain 	 0 days remain 
 3 days remain 	 0 days remain 	 3 days remain 	 0 days remain 	 3 days remain 	 0 days remain 
 2 days remain 	 0 days remain 	 2 days remain 	 0 days remain 	 2 days remain 	 0 days remain 

✂ *Expansion Pack: For a longer and more interesting game, use this extended checklist.*

CHECKLIST for Big Project: Check off completed							
Phase	Sequence	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
I: Subsurface	I	Mobilize					
		Demolish					
		Clear Site					
		Pile, Sheet, Lagging					
	II	Access Ramp					
		Dewater Well					
		Excavate					
		Form Footing					
	III	Survey					
		Concrete Footing					
		Sewer Pipe					
		Swimming Pool					
2: Structure	I	Atrium Scaffold					
		Erect Steel					
		Form Slab					
		Post-Tensioning					
	II	Concrete Slab					
		Shore / Reshore					
		Stairs and Ramps					
		Garage Annex					
	III	Bricklaying					
		Fireproofing					
		Joists and Rafters					
		Façade Modules					
3: Finishes	I	Glazing					
		Thermal Insulation					
		Electrical Outlets					
		Pave Parking					
	II	Mechanical HVAC					
		Plumbing Bathrooms					
		Granite Tile					
		Install Fountain					
	III	Roofing					
		Custom Paint					
		Landscaping					
		Demobilize					

