TWiG Facilitator's Guide V1.5-EN

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Introduction

"TWiG - The WiP Game" is a lightweight Simulation of a WIP limited pull system (like, e.g. Kanban) developed by Klaus Leopold. In contrast to more elaborate simulations, it is a simple way to let the players get an idea of working in a WiP limited system. TWiG is not designed as a learning tool. You already need to know the basics behind WiP limited pull systems (e.g. have run the ship-building simulation in advance) in order to play it. The required playing time is around 90 minutes. You can't win ANYTHING - only become wiser.

The intended use is to play one round with the assigned WiP limits. So - per default - there will be no comparison to an unlimited system. Of course, variations (e.g. unlimited, different WiP limits) are possible.

Suggested optimum number of people per team: 3-5 (with less people it will take longer due to the metrics documentation, with more there will be more discussions).

TWiG has been released under the "Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)" license. The necessary files can be downloaded at https://www.leanability.com/en/twig/ There is also a German version available which can be downloaded at https://www.leanability.com/de/twig/

Game Setup

Materials Checklist

Disposable

- ❏ 1 x charts printed A4 normal paper
- ❏ 2 x game instructions + daily routine on normal A4 paper
- ❏ 1 x Event cards on thick yellow A4 paper, Duplex, Short-Edge binding
- ❏ 1 x Blocker cards on thick A4 paper, Duplex, Short-Edge binding
- ❏ 1 x Defect cards on blue A4 paper, Duplex, Short-Edge binding
- ❏ 1 x Playing cards on thick yellow A4 paper, Duplex, Short-Edge binding

Reusable

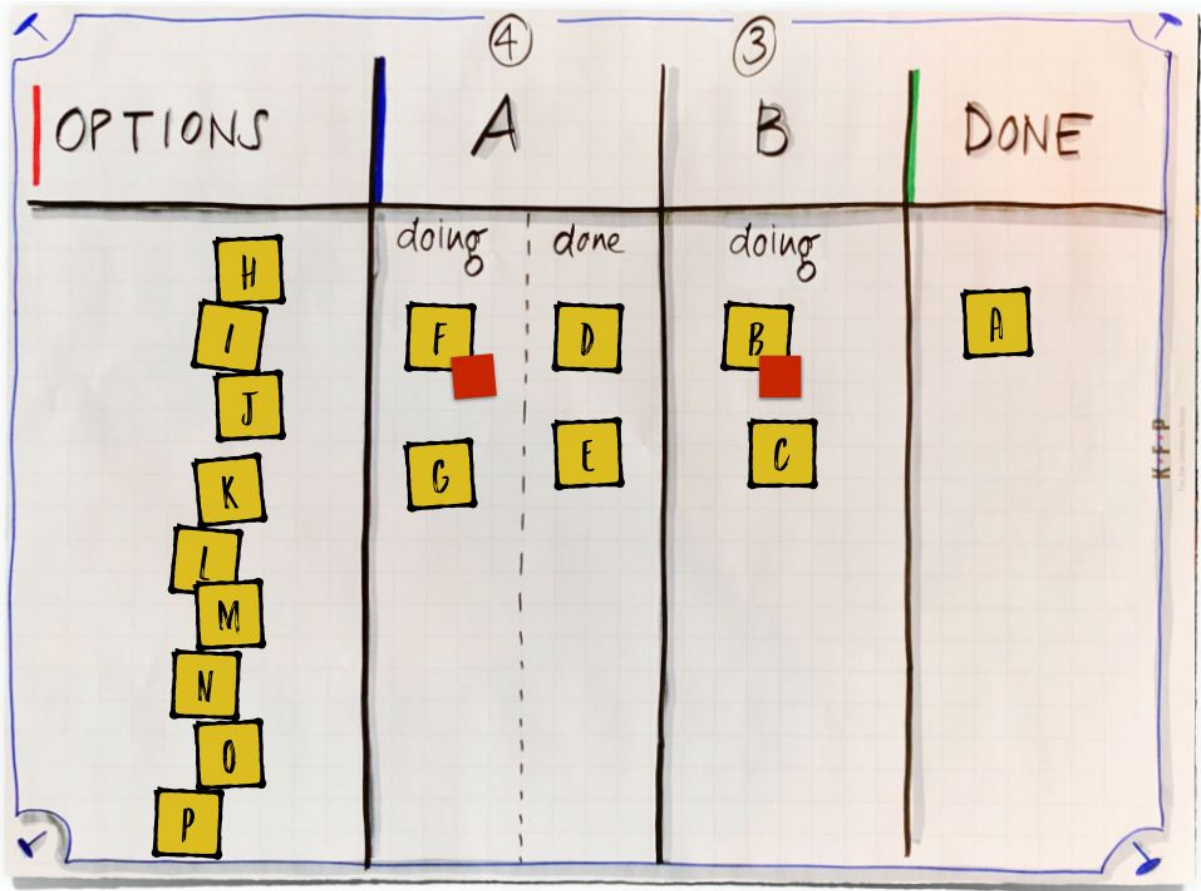- ❏ 6-Sided dice: 3 x color 1 and 2 x color 2
- ❏ Pens: red, blue, green

Board Setup

The board consists of four columns: OPTIONS, A, B and DONE. A and B are two different areas of specialty represented also by the two different colours of the dice. The amount of work available is determined by the numbers rolled. Work may be distributed over the areas of specialty. During standup the dice are assigned to the tickets in process. A die (or specialist's work) may be assigned to another area of specialty - the available work (read: number rolled) is then halved.

Note the red, blue and green lines at the top of columns, used for counting work items for the Stability CFD. Participants will draw their own, and place the work items A → P as in the pictures below. It is useful to have 3 Blue and 2 Green dice to match the colours.

Please note: The WiP Limit for column A is 4, for B it is 3.

Card Setup

The Blocker cards (that is, both OK and Blocked) are shuffled and placed as a stack face down.

The event cards are sorted by day (day 5 on top) and placed as a stack with the descriptive text facing down.

The simulation starts on day 5.

Game Instructions

General Rules

1. **Most Important Rule:** Whenever you have a question regarding rules, ask yourself: **"What would I do in real life?"**

    TWiG tries to simulate real life and therefore, your game play should be as close to real life as possible!

    Some examples for "What would I do in real life?"
    - Do you round up or round down .5 when halving the dice roll?
      Proceed as you like, but stick to a once made decision. I round up.
    - Do you put dice on cards or columns?
      If dice represent people, in real life, people would discuss in the standup who's working on what work item. So yes, I'd put the dice on the single cards. However, maybe in a mob programming world one would do it differently.
    - Since you can rollover extra points, would anyone ever put dice on more than one card and risk not finishing a card?
      When I roll a 6 and strike-off 3 point, what's the time? ;-) Sounds crazy but it makes sense: It's noon. What would a person do if she finishes a ticket at noon? Most likely she would go to the board and pull in new work or help another person. That's how you could spend the remaining 3 points in real life.
    - Is it allowed to use remaining points from dice in column A to tickets in column B?
    - For the emergency ticket (day 9) it was not clear whether we are allowed to ignore the WiP limits. (handle the ticket as "expedited" with a special rule)
      The emergency ticket says "we are out of business". What would you do in real life when you're out of business? Stick to WIP limits? Most likely not! Let's assume you're a bank and it's not possible to do any transactions for your customers. Would you answer like "you know we cannot work on this issue as we most honor our WiP limits"?
    - Event card day 12: may I use also 2 dice to work on the defect?
    - If you fix the defect and you have a higher result than you need, can you use the remaining points to work on some other ticket? or even the ticket with the defect?

2. Blocker Rules

2.1. Blocked tickets can be unblocked with 4 points.

2.2. If less than 4, the blocker remains.

2.3. If there are more than 4 points, the remaining points can be used as work. If e.g. 6 points were rolled, 2 points can be used as work.

2.4. When a ticket is completed and there are still points left, the points can be distributed to other tickets or new work can be started.

3. Work

3.1. Dice represent people, and the number rolled represents the effort available to spend in one day - almost like in real life ;-)

3.2. If a die is rolled in it's area of specialty (same colour die and column) - strike the number rolled off the expense points of the ticket.

3.3. If points are left over, they can be used on other tickets. You can start new tickets or work on other tickets.

3.4. If a die is not rolled in your own specialty, the score is **halved** (and rounded-up). Logic behind this: A non-specialist does not bring the same performance as a specialist.

3.5. You can put several dice on one ticket. If three or more dice are placed on a ticket, the points from the third die are **halved**. Logic behind it: Pairing is a good thing, but it does not scale linearly. For example, if 20 people are working on a job, they are not 20 times as fast.

3.6. Cards can be dragged from left to right at any time if the WIP limits are met
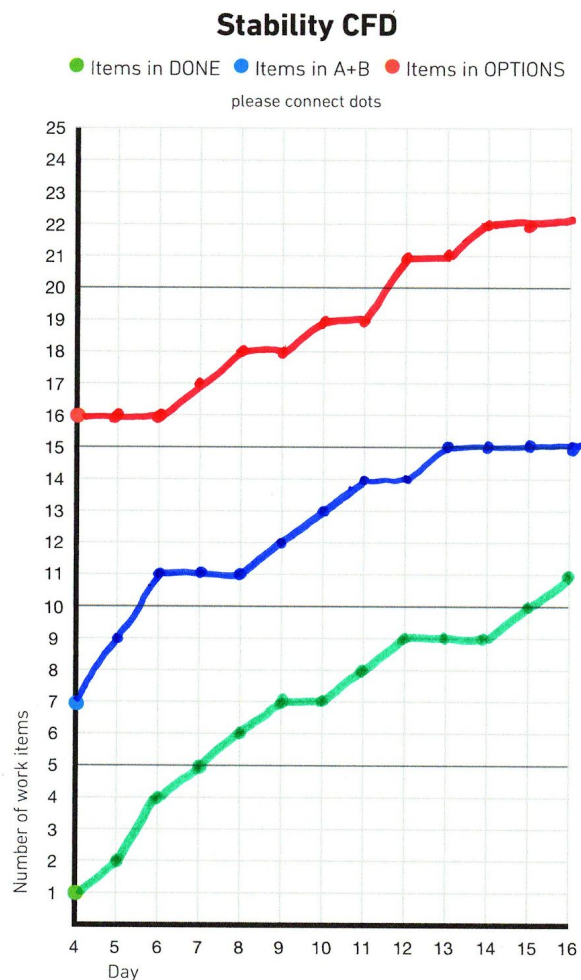
Daily Routine

1. Pull one card from the OK/blocked stack for each unblocked ticket in the DOING columns (A and B)

   1.1. Put the cards on the tickets - only the blocked cards remain attached to the tickets. All OK cards go back to the bottom of the stack.

   1.2. Tickets in DONE columns can not be blocked.

2. Standup

   2.1. Put dice on the tickets.

3. Work

   3.1. Roll all the dice.

   3.2. Analyse the results, score points (and move cards) - removed blockers go back to the bottom of the stack.

   3.3. **Do not forget:** Enter start day for new work!

4. For complete tickets:

   4.1. Fill in the End day on the ticket.

   4.2. Calculate Realization Time: End - Start + 1

   4.3. Fill in the Realization Time and Delivery Sequence.

   4.4. Fill in the Realization Time Distribution chart.

   4.5. Fill in the Throughput chart.

5. Fill in the Stability CFD

6. Take an event card and read it aloud

Metric Sheets and Stats

Metric Sheets

Stability CFD (Cumulative Flow Diagram)

At the "end" of each day, start from the bottom and plot a green mark for the respective day and the sum of completed items in the DONE column (it starts at day 4 with 1 completed ticket) first. Then count the items in both columns A + B (day 4: 6) and add these on top, so the resulting value indicates the position of the blue dot (day 4: 1+6 = 7). For plotting the red dot, you count the number of the tickets in OPTIONS (day 4: 9) and also add those on top of the previous value (day 4: 7+9 = 16).
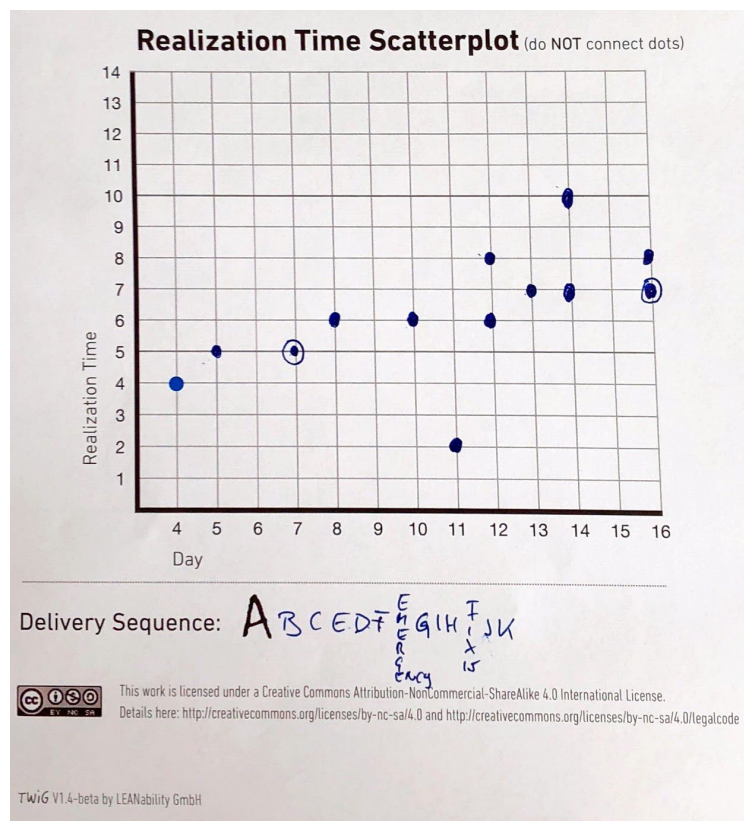Dots with the same colour are connected to a resulting line graph.

Realization Time

Note down the realization time of completed work items. The X-axis represents the day and the Y-axis is the realization time. The realization time value is calculated from the following formula:

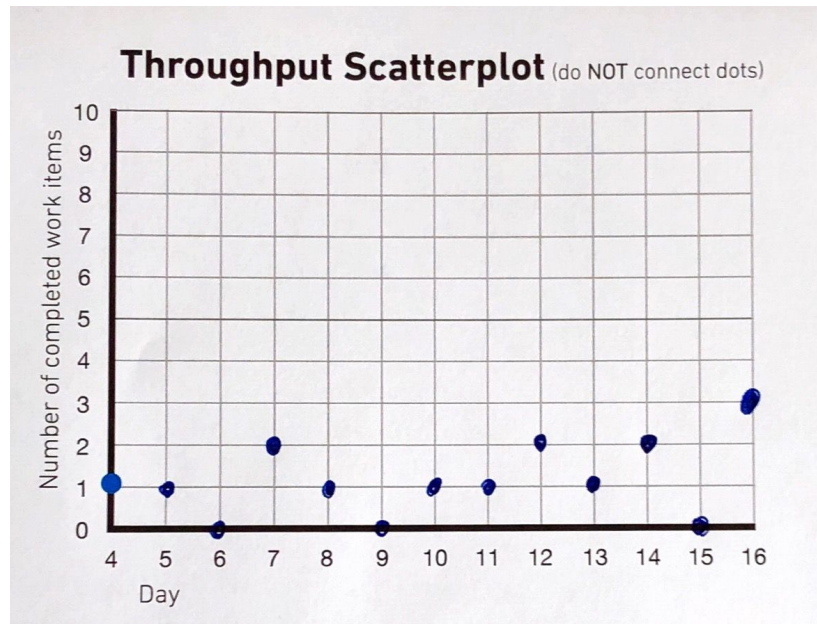**Realization Time = End Date - Start Date + 1**

If there are multiple items completed on the same day, note down multiple dots on the y-axis like shown e.g. on Day 12 in the chart below. If there are two work items which are completed on the same day with the same realization time, draw a bigger dot like e.g. shown on Day 7 in the chart below. Do **NOT** connect the dots. The resulting diagram is a scatter plot.

Realization Time Scatterplot (do NOT connect dots)

Delivery Sequence: A B C E D F G I H J K
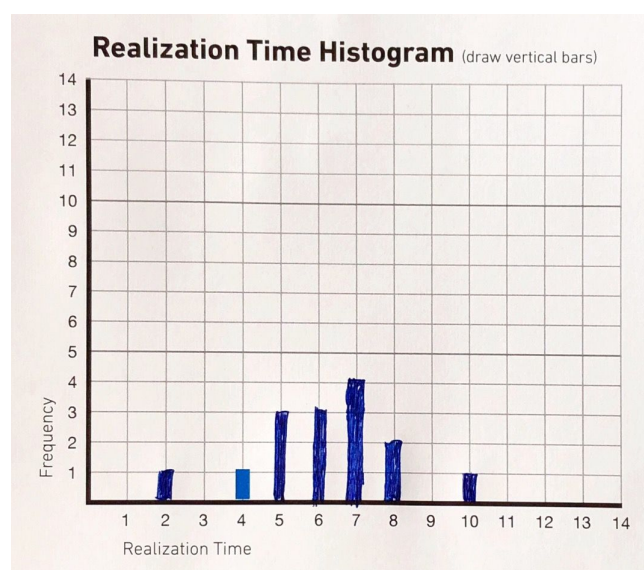
TWiG V1.4-beta by LEANability GmbH

Throughput

Plot the value of completed work items for each day.

Do **NOT** connect the dots. The resulting diagram is a scatter plot.

Realization Time Histogram

The Y-axis is showing the frequency (that is, the amount of occurences of different realization times) of realization times. So if e.g. another work item is completed within 4 days, you extend the height for the bar at the realization time of 4 to match the resulting value.

End of Game Stats

Note down the respective values for
- EMERGENCY delivered on day X
- Average Arrival Rate

  The arrival rate shows how much work per time unit enters the system. So the AAR is calculated by the sum of work items entering the system (through the OPTIONS column) divided by the number of days. You calculate arrival time for a given time window. E.g. from day 4 to 16 this means the number of days would be 12 in this case.
- Average Departure Rate

  The departure rate shows how much work per time unit leaves the system. So the ADR is calculated by the sum of work items leaving the system (read: being completed) divided by the number of days. Departure rate is calculated in a time window like arrival rate.
- WiP Age

  Write down the WiP Age for each work item in process as a comma separated list and calculate the average WiP Age by adding up the age of the work items and dividing it by the number of items.

Facilitator tip: Explain what arrival rate and departure rate is and let participants figure out on their own how to calculate it.

Debriefing

Discussion ideas:

- Did you notice any similarities and differences to your current work environment?
- How did you manage the EMERGENCY, FIX15 and ChBl tickets?
  - Are these work items familiar? How can we visualize and handle these kinds of work items in Kanban systems? What's important?
- Did you pair (in other words: work with multiple dice on one item) often? Why? Why not?
- Did you roll dice in non-specialists areas? Why? Why not?
- Were you consciously over or under your WIP limits?
- How did you experience the reduction of WIP limits?
- Were you always clear what to work on? If not, what would you improve?
- Why is it bad to rely on averages when committing to dates? What would be better?
- What do you need the arrival and departure rate for?
- What do you need the WIP age for?
- Did you have many blockers? How did you handle it?
- How well did you collaborate as a team?

What insights or questions do you have?

Q&A

Q:All of the cards have the same number of effort points, right?
A: Yes, all have 6 effort points. Very convenient, we already know the effort in advance and all cards have the same effort/equal size. If someone says, "that's unrealistic, in reality there's uncertainty involved", the facilitator's answer could be, "you are right, in the simulation uncertainty is represented by the dice which is easier than randomly printing tickets with different efforts".

Q; Wouldn't it make sense to have differently sized work items instead of them all being equally sized with 6 points? So e.g. items with less, say 4, or more, maybe 8 points? Just to simulate real live conditions and some kind of variability as well as possible?
A: There is variability contained in the design of the game - although not within the work item size, but within the numbers rolled. It's easier to roll a die than print cards with randomly sized work. The variability is also quite high since one is able to roll a 1 with the same probability of rolling a 6.