THE FROG FACTORY – A KANBAN EXPERIENCE

The Frog Factory is a fun and fruitful way of learning basic Kanban principles. The simulation can be played with any number of participants (6 to 20 or more). The group has to be divided into two equal teams (if the number of participants is odd, the points calculation needs to be adjusted, which is done automatically in the spreadsheet that is part of this package).

Playing time: five rounds of six minutes each, plus introduction, discussion and reflection time is about two hours. Apart from the teams, there is one instructor who guides the game, counts the results, and makes them visible. It helps if the instructor has an assistant who plays the customer role and starts the timer, so that the instructor can focus on the game rules and the discussion.

MATERIAL

- Three different colors of square origami paper, about 25 sheets per participant in total
- The Frog construction manual, one per team
- A six sided die (a large one can be made from the template that is part of this package).
- One sheet titled "Frog Factory – Experience sheet" per team member
- Four bins per team, labeled 1 to 4 (this can be any recipient as long as enough frogs fit into)
- A computer with the Frog Counter (a freeware tool that counts the rounds and gives 30 second bleeps; you can also use two kitchen timers) and a computer with beamer to show the scores (alternatively, this can be done on a whiteboard)
- A suitable room

TRAINING

Walk the participants through the four construction phases until they are able to complete each step in about 30 seconds (only if the group is particularly unhandy, increase the number of seconds per bleep).

After training, every person can indicate what construction phase they feel “expert” in and what “senior”. Hand out the experience sheets. Every participant can choose one construction phase they feel expert in and one they think they are senior. Let them indicate this on the experience sheet.

After that and only after that, divide the group into teams.
FORMING TEAMS WITH SOCIAL SCALING

Ask participants to line up form one wall to another. Those with most kanban experience (even if it's only little) should stand to one side, the real newbies stand on the other side. They should not stand in groups but really line up depending on experience. The instructor then assigns numbers to the participants from one end to the other (1-2-1-2 and so on) such that both groups have equal experience with kanban (not frog folding, obviously).

ROUNDS

- First round: smooth flow
- Second round: market variability
- Third round: training effect
- Fourth round: disturbances
- Fifth round: the grand finale

After each round, there is 10 to 15 minutes group discussion. A group discussion has following ingredients:

- State the facts: what happened? How many points did the teams earn?
- Search for causes: what causes the productivity (or lack of it)?
- Discuss solutions: how did teams solve the problems they encounter?
- Link to the real world: what lessons can be learnt for the real world? How can we abstract from “frog folding” to running our complex business processes?

CONSTRUCTION PHASES

Construction phases include in this order:

1. The Frog Base
2. The Frog Back
3. The Frog Belly
4. The Frog Legs

Any stage in the construction process of a frog takes 30 to 90 seconds. An expert takes 30 seconds, a senior 60 seconds and a junior 90 seconds. After each step of the construction process, the frog must be placed in the right bin. For the details of the construction process, see the manual.
It is important that the proper construction process is followed, i.e. that the exact amount of time is used depending on the player’s expertise level, that frogs are decently built, and in the right order of construction. Any frogs constructed violating this process will be considered void. The instructor will oversee the process and take measures if needed.

To insure that the right amount of time is used, participants are only allowed to put the frog in the bin exactly at the bleep.

**PREPARATION**

- Have the teams seated and put the four baskets in the middle. Indicate the bin the customer will use to buy frogs from. Don’t set the bins up in any particular order, instead wait for order to appear during the game.

- Hand out the manuals (one per team).

- Hand out origami papers of the different colors to the teams. Don’t mention the different colors, if asked, point out that colors have no importance.

- Point out that teams are self-organizing, so that they can choose how to partition work. Allow five minutes preparation time.

**ROUNDS AND DISCUSSION**

Playing games is fun, but when you can actually learn something, it’s even more fun.

The game takes place in five rounds, each focusing on a specific topic:

- **Round 1:** solving bottlenecks to obtain smooth flow. Work-in-progress limits to help solve bottlenecks.

- **Round 2:** market variability and agility and the value of stock.

- **Round 3:** the effect of training: deeper expertise for optimal flow. Broader expertise to limit dependency on disturbances.

- **Round 4:** process disturbances and how to obtain smooth flow even in unstable environments

- **Round 5:** kanban, the big picture. How to transfer what we have learned to the real world.

Apart from these five specific topics, following topics will be brought up during the discussions more than once:

- **Visualising workflow:** why it is important and why it is equally important to keep the visualisation in synch with reality
• Importance of communication and island work versus team work
• Expertise in the head and hands of a limited number of people
• FTE: are people just "resources"? is "adding people" a way to achieve higher production?

FIRST ROUND: SMOOTH FLOW

During the first round, players become at ease with the construction process, learn how to divide the work amongst them, and earn their first frog points. Award one point per properly constructed frog per team and indicate the results so that everyone can see them.

GROUP DISCUSSION

After the first round, organize a group discussion focusing on production differences between teams. The word “bottleneck” should be central. Conclude that having a WIP limit (Work in progress, or number of unfinished frogs in bins 1 to 3) may help to have smooth production flow.

SECOND ROUND: MARKET VARIABILITY

From this round on, colors begin to play a role. Randomly pick a color and announce that frogs in this color are worth “more” due to popularity. After the round, award 2x the normal points for frogs in that color. From now on, throw a die before each round. If the result is 6, move one step in the direction of the arrows (see diagram). If the result is a 1, go one step in the other direction. If the result is 2, 3, 4 or 5, market conditions do not change. For example if the popular color is green and you throw 1, the popular color will become blue. Don’t tell participants what the new market conditions are, but tell them if they have changed or not.

GROUP DISCUSSION

The group discussion of the second round should focus on “agility”. How fast can teams adapt to the current market conditions? What is the value of stock? (“stock” being unfinished frogs in baskets 1 to 3).

THIRD ROUND: TRAINING EFFECT

This round is equal to the previous, except that from now on, players can choose to invest in training. Any expertise upgrade costs 6 bleeps. For example, a CP 1 junior can become CP 1 senior if he invests 6 bleeps. During these 6 bleeps, he has to leave his team and cannot continue folding frogs. Per round,
only one training can be followed per participant. A participant can choose when to follow the training (begin, middle or end of the round).

Don't forget to apply market conditions.

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**GROUP DISCUSSION**

After the third round, focus the group discussion on the effects of training and why people chose whether or not to train: trade-off between productivity now and productivity in the future, having seniors or experts for each construction phase.

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**FOURTH ROUND: DISTURBANCES**

Each team throws a die and depending on the result, a disturbance happens:

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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Loss of expertise: the instructor randomly chooses one participant from that team. One of his expert skills becomes senior skill (instructor randomly chooses one if needed).</td>
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<tr>
<td>2</td>
<td>Illness: randomly choose one participant from the team who misses the first four bleeps of the round.</td>
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<tr>
<td>3</td>
<td>Budget cut: this round, no training is allowed for that team.</td>
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<td>4</td>
<td>Supply troubles: take away all unfolded papers from the most popular color of the previous round from the affected team.</td>
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<tr>
<td>5</td>
<td>Fire in the corporate stock: randomly take away five unfinished frogs in different baskets (1 to 3) from the affected team.</td>
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<tr>
<td>6</td>
<td>Corporate reorganisation: take all expertise sheets from the team, shuffle them and hand them out again.</td>
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Don't forget to apply market conditions and leave room for training.

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**GROUP DISCUSSION**

There’s no point in being agile if nothing ever changes. In our complex business world, outside factors affect processes. What worked yesterday might not work today. The key to agility is to being able to adapt.

As an example, people get ill. That is especially nasty when the ill person is the only expert in a certain stage.

Probably every team will have focused on training precisely one expert for each construction phase. This makes the flow smooth, but also vulnerable. Broadening people’s expertise solves this problem.
FIFTH ROUND: THE GRAND FINALE

Announce that the CEO will visit the frog factory today. She is keen to see her top teams producing more frogs than ever, and she awards double points during the fifth round.

Don’t forget to apply market conditions, leave room for training, and to introduce a disturbance.

GROUP DISCUSSION

Focus on the big picture: how did production go up (or go down) during the five rounds? Which team was the most efficient and why? How can the lessons of the frog factory be applied to the real world? And to what extent does it help that the workflow is visualised?

AWARDING POINTS WITH UNEQUAL TEAMS

If the teams are not equal in size, award more points per frog to the smaller team as follows. If team A has 5 members and team B has 4, team 2 gets 5 points per frog and team A only gets 4.

This can lead to a discussion about “Full Time Equivalents”: 5 persons working on a task are not necessarily 20% more productive than 4.

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