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Lifelong Learning Programme

Active vocational learning in project management for trainers

A Leonardo Partnership project

Simulation of agile method Scrum using Lego

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Building campus

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Scrum

Scrum has recently become one of the most popular and most widely used methods of agile project management. It is a process framework that is used to develop products in a dynamically changing environment. Originally it served as a management tool, but today nearly any complex innovative project can't be done without it.[1] Scrum is simple and has easy rules, but all the more it is difficult to implement it. It is based on three pillars:

1. Transparency – Significant aspects of the process must be visible to those responsible for the outcome. Transparency requires those aspects be defined by a common standard so observers share a common understanding of what is being seen.[2,]
2. Inspection
3. Adaptation

Inspection and Adaptation are closely associated. The various aspects of the process must be inspected frequently enough so that unacceptable variances in the process can be detected. For example the Scrum components of Spring Review and Sprint Retrospective make for above mentioned.[3]

What about Scrum benefits?

The objective of the Scrum is development facilitation of the product which final features aren't obvious during the planning. The development proceeds in short Sprints – output of each Sprint is functional iteration. The product is improved in every Sprint and additional properties are added.

At the same time Scrum assumes an intensive involvement of the customer in the process of output creation.

Scrum Roles

Scrum Master

Scrum Master helps the Team, protect it against an external interference. He/she trains and leads the Product Owner and Team so that they use Scrum well. Scrum Master helps the Team and Product Owner to solve impediments that will arise during the product development.

Scrum Master and Product Owner aren't identical persons. The task of Scrum Master is not to distribute duties and to assign responsibilities but to simplify the Scrum process and simultaneously to enforce the rules of the game and to support the Team and secure smooth running of product development.[4]

Product Owner

His/her task is to make up the list of activities (sorted by priorities) that needs to be done in order that the product would be successfully finished – i. e. Product Backlog.

He/she makes decision about which activities should by executed in the Sprint and he/she adjusts the Product Backlog throughout the project.

Product Owner, who has the last say is always only the one. He/she decides about result – if he/she accepts the product or not. The task is fulfilled when the Product Owner confirms it.[5]

Team

The task of the Team is to execute loads from the Product Backlog in order to create functional product. The Team is multifunctional and disposes of all required knowledge for accomplishment of the project. The Team is self-dependent and responsible. Generally it involves 7 persons (±2). The Team cooperates with Product Owner – it comes up with ideas for product improving and discusses results with him/her etc.[6]

Learn Scrum basics and have fun!

Scrum Events

Product development is executed in several terminable Sprints that have fixed period of duration, usually 1 – 4 weeks. Sprints are never prolonged and they are the same length within the scope of one process.[7]

Sprint Planning Meeting

The Product Owner and Scrum Team (with facilitation from the Scrum Master) review the Product Backlog, discuss the goals and context for the items, and the Scrum Team selects the items from the Product Backlog to commit to complete by the end of the Sprint starting at the top of the Product Backlog Product Owner.[8]

Daily Scrum

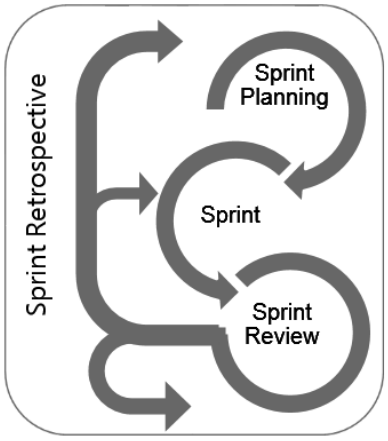
This is a short (15 minutes) Daily Stand-Up Meeting that happens every workday at an appointed time. This meeting is important for the identification of problems.[9]

Sprint Review

After the Sprint ends, there is the Sprint Review, where the Scrum Team and stakeholder inspect what was done during the Sprint, discuss it, and figure out what to do next. Present at this meeting are the Product Owner, Team Members, and Scrum Master, plus anyone else interested.[10]

Sprint Retrospective

This is an opportunity for the team to discuss what's working and what's not working, and agree on changes to try. Also the team cooperation and dynamics are discussed.[11]



Scrum Artifacts

Product Backlog – requirements

Checklist of requirements (tasks), that are sequence according to priorities and that are necessary to do due to the successfully product completion. Product Owner is responsible for the composition of Product Backlog – he determines the tasks and their priorities. The Backlog changes during the project lifecycle – items change their priority, new items are added or taken away.[12]

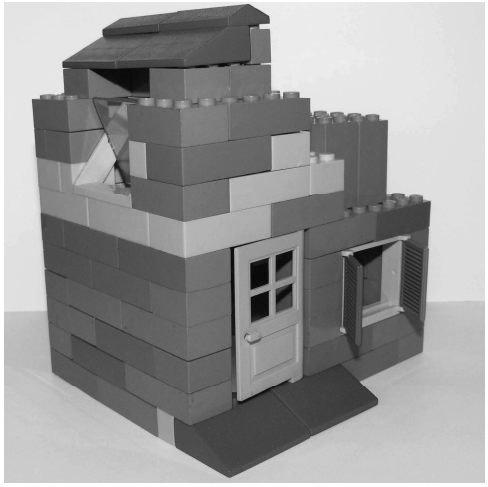
Sprint Backlog

Sprint Backlog is a list of the tasks and requirements to be completed within the sprint. Team chooses the tasks according to the highest priority. Consequently, the tasks are split into particular sub-tasks.[13]

Burndown Chart

It is used as a tool helping the Team to finish the Sprint in time. It shows what was done and what is still necessary to finish (it can be determined by the number of tasks or hours)[4]

Honesty and openness of team members are absolutely essential for Scrum!



Lego simulation - Campus

This simulation was created within the frame of the course 3MA531 – Project Management Introduction, which is taught at the University of Economics in Prague in terms of minor specialization 3PM Project Management. The simulation was created by students – namely Bc. Ondřej Fišer, Bc. Lukáš Mareš, Bc. Iveta Svatošová, Bc. Jana Šenková a Bc. Adéla Škodová. The brochure was translated by Bc. Lenka Boháčková and Radovan Kačín.

Following paragraphs are designed for the "Trainer" who will conduct the simulation workshop. This Trainer should have experience in leading teams or at least with organization and managing of workshops. It is necessary to keep track of the Team dynamics, behavior of individual team members and negative impacts that could jeopardize the simulation process. The simulation results from approved methods created by the experts in this domain[15] but it is adapted for participants who do not have any experiences with Scrum or Project Management as well. A special element (relatively unconventional) was included – it brings to the game a random efect.[16]

This simulation can be used by both public educational institutions and private training institutions. It is one of the participant-centered approaches that enables trainees to understand Scrum and gain new experiences in Project Management.

How to do it?
Information not only for the Trainer.

Objective and process of simulation

The objective is to build a university Campus following the requirements of Product Owner (hereinafter PO) using Lego brick-box – and to train one of agile methods of project management – Scrum.

Ground rules

PO should be acquainted with basic principles of Scrum method.

This guideline is designed for PO – players obtain only the list of requirements which is mentioned in a special paper.

The simulation takes approximately 90 minutes (without arrangement of premises). It is desirable to keep the time of each phase stated in the guideline because timeboxing is one of the conditions of Scrum method.

The game is played by several teams simultaneously whereas the perfect size of one team is 5 members. Limitation presents the amount of Lego bricks. Each team needs at least 1300 basic bricks of various colors and sizes.

Tools for the simulation

- Lego brick-box (see page No. 7)
- A1 flipchart papers (3 for each team – 1 for fairway, 1 for Backlog and 1 for Swimlane Sizing)
- Post-it pads (76x76 mm, min. 50 pcs.)
- Markers (6 basic colors)
- Plastic tape, scissors, ruler (30 cm length)
- Highlighters (4 basic colors)
- Cards "Random events" (see Sources and links)
- Stickers up to t-shirt (for the number of individual team members)
- PC with projector and internet access (it is not required to have any special SW)

The course of the game

The game consists of 3 main phases which will be explained to players by PO. These phases are Planning, Sprint and Debriefing. PO is the fundamental person of the game – everything runs following his instructions and he/she guides the players through all phases. PO may change rules during the simulation. The result of the game depends on his/her own subjective evaluation of outputs of particular teams. During the whole process the timekeeping is displayed on the screen/PC – it is possible to use http://www.online-stopwatch.com/full-screen-stopwatch/.

Planning

Teams' formation

First of all it is necessary to establish teams of 5 members. The teams have to be established without any discussions, based on PO instructions. Afterwards each team member will get one number from 1 to 5 from PO and consequently will stick the number upon own t-shirt. Numbers are constant during the whole simulation.

The length of the phase is 5 minutes.

Project proposal

PO explains to players what will be their task. The verbal communication is limited or none during this phase.

The task for players is to build a university Campus using Lego brick-box according to requirements of PO who is the only one person who makes a decision about Campus appearance. PO explains the course of the simulation (creation of Backlog, 3 phases of the Sprint).

The list of requirements

- Roads (drawing)
- 1x university – two floors 2,5x2x6
- 1x campus – three floors – 3x2x14
- 1x pub – 2,5x2,5x5
- 1x shop – 2x3x6
- 1x library – 2,5x3x5
- 1x health centre 4x2x6 – with red cross on the roof
- 1x church – 4x2,5x6 – cross + tower
- 1x volleyball court (creation of volleyball net, the rest of the court - drawing)
- 1x open-air cinema with screen and enough seats
- 1x football stadium (creation of goals, the rest of the court - drawing,)
- 1x bus stop with column
- 1x bridge over the river
- 12x green (6 bushes + 6 trees – 2 types, 3+3)
- 10x bench

All buildings have to have windows and an entrance. Campus should be consistent in color and the type of each building should be apparent from the first sight.

The proportions of building are shaped in basic size of bricks 4x2 (1 = one brick), height (3. proportion) is the number of bricks. Proportions of courts, bus stop, benches and green are according to consideration of players, but it should correspond in proportion to others buildings.

Another possible instruction (consist in the imagination of PO; it can be provided immediately or after the Sprint:

- All roads should be rectangled.
- All roofs should be red coloured.
- …

The length of the phase is 10 minutes.

Creation of requirements list

Based on the List of requirements of PO the teams create a list of buildings through the use of Post-it pads (1 paper = 1 item from the List). PO adds information on how the Campus should appear (what will be sufficiently delineated and what is need to be built and he/she introduce the appearance of particular buildings. The teams will receive a basic map (made up from one flipchart paper) of the Campus on which they will build it up – here is a river (delineated by PO), teams will line here the drive way. Any discussion is not possible. After the PO will forward his/her own requirements to participants the Phase of Estimating starts.

Estimating

Estimating is one of the most difficult parts of the simulation. The teams with the help of PO estimate difficulty of particular tasks. They define preferred tasks, time needed for accomplishment of one item and number of persons needed for fulfillment of the tasks. One of the methods how to estimate by the most effective way is Swimlane sizing.[17] A chart with 8 columns (upwardly numbered) is drawn on the flipchart paper. The players are subsequently asked to shift their Post-it papers from backlog to the column which presents construction difficulty of given building (1 – the lowest, 8 – the highest).[18] In the case of Campus there should be for instance benches and trees in the left column. This activity proceeds again without any discussions. Every player has to have a possibility to participate. Thus the players shift particular buildings so that they would be logically grouped in the light of difficulty and significance. None of the buildings may interfere with two columns. Frequently it happens that team members are not able to agree on the importance of one building and they continually shift it among the columns. In this case the PO has to intervene in it effectively.

When all buildings are shifted the PO will ask if all players are satisfied with the result. If not, then those who aren't, go to shift again. If all participants are satisfied it is possible to go over the next phase after approving of particular items by PO.

Truly agile approach would be to discard planning and focus on the product!

Backlog creation

After completion of estimating phase the Post-its with particular items are moved on flipchart paper with table with particular sprints. Backlog is the outcome – plan with all items that teams will use in the next phase.[19]

The whole phase of estimating and preparation of Backlog takes maximally 15 minutes of time.

Sprint

Sprint is the phase of implementation. The simulation has 3 sprints in total; each sprint has 3 parts – Sprint Planning, Sprint – implementation, Sprint Review. Before 2nd and 3rd Sprint Planning the teams get out 2 cards of "Random events" that give them constraint or advice and that they have to follow during a given sprint. PO may but doesn't have to participate in sprint and cooperate with the team – it is fully up to his/her consideration.

Sprint Planning

The teams make a decision on what and how they will do during the sprint, they move the Post-it papers from Backlog to flipchart paper with illustration of sprints' process.

The length of the phase is 3 minutes.

Sprint – implementation

The teams realize the items that they planned, keep constraint/advice from Random event which they have pulled.

The length of the phase is 5 minutes.

Sprint Review

The team presents to PO what was done in a given sprint. PO gives them feedback and adds information about what and how he imagines it, what he/she likes or not. Team members discuss shortly on what they should enhance and what they should avoid. The discussion with PO is allowed only in this part.

The length of the phase is 5 minutes.

The whole Campus should be built during 3 sprints that run in total.

Debriefing

The Debriefing is the last phase of the simulation and it proceeds in form of discussion. The open questions and lessons learned are discussed and the players give a feedback.This phase is the most important phase of the simulation. The task of the trainer is to guide players effectively so that they would find out and figure out where they made mistakes and conversely what they did excellently.

Possible questions for participants of the simulation:

- What did you learn through the game?
- How it was to be a part of the team?
- How accurate were your estimations of the tasks' seriousness.
- How was the Product Owner's work?
- What did you feel after the first sprint when you had to rebuild all items?
- How worked the team communication?
- ...

The length of the phase is approximately 15 minutes.

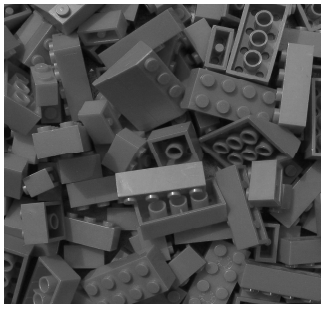
Suitable brick-boxes

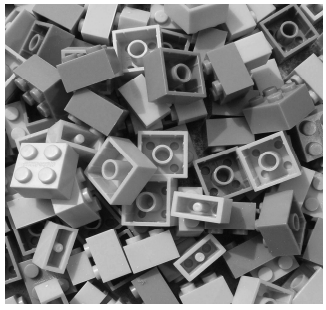
Original Lego bricks are the best option for this simulation, but they can be replaced by bricks of other brands. Suitable brick-boxes:

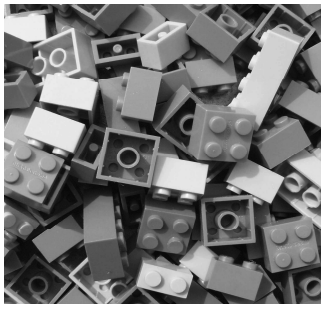
- Lego Creator Basic 5512 (1600 pcs, basic bricks + extras)
- Lego Creator Basic 6177 (650 pcs, basic bricks)
- MegaBloks Micro 00255 (500 pcs, basic bricks are compatible with Lego, but not all bricks are suitable)
- MegaBloks Micro 89989 (1250 pcs, basic bricks are compatible with Lego, but not all bricks are suitable)

The content of kits is relatively frequently changed, therefore it is necessary to consider carefully which kit should be bought. For the purpose of this game (5 – 6 persons in team) minimally 1200 pcs of bricks are required (sizes: 4x2, 4x1, 2x2). If you have another available sizes it is beneficial both for quality of product and simulation overall.

During the simulation the players will acquire essentials of the process used in the Scrum







What is the target?

The purpose of this simulation is to illustrate to students one of methods of agile project management – Scrum by playful and spontaneous form.

Based on empirical and historical research it is clear that the best way how to learn is learning by doing when person can try a given issue. In this way the level of comprehension and also the time of remembering are increased. Mentioned significance is indispensable within teaching of new approaches and that is why it was chosen as a general method for forwarding of information to students. This version of fun form of simulation game will have added value in it that it is, among other things, designed for people who have never heard from project methods or project management.

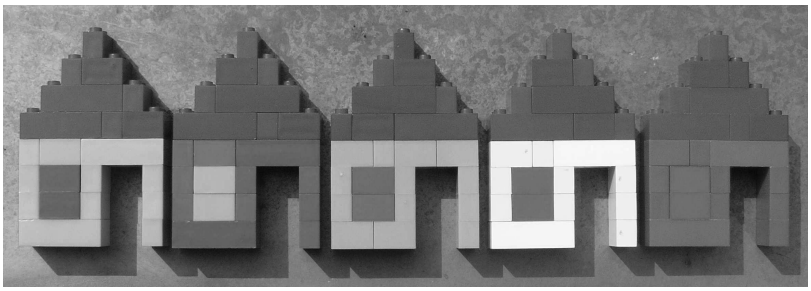
Why Lego?

As a tool for simulation the Lego brick-box was selected. It is commonly known and is a stable attribute of playfulness. Due to that fact it is a perfect tool for practical case of simulation of project method Scrum.

Nevertheless the biggest benefit of this game is making students acquainted with modern agile methods of project management that along with conventional and tested methods create comprehensive concept or project management which is implementable in every company regardless of industries.

Other benefits?

This simulation can be used as an educational tool of project management at different universities or in training organizations because it is easy to share.



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Worth mentioning is also the book of Ken Schwaber Agile Project Management with Scrum (SCHWABER, Ken. Agile project management with Scrum. Redmond, Wash.: Microsoft Press, c2004, xix, 163 p. ISBN 07-356-1993-X.).

All materials including complete gallery of sample buildings and playing cards are available online: http://llp-leonardo-partnership.webnode.cz/project-documents-downloads/project-outputs/

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