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ADVANTIG - ADVANced Technology Implementation Game

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Abstract

The paper describes ADVANTIG, a role playing game about planning and implementing technology in a company-like setting. An evaluation of two examples of how to use the game in a company and in a teaching context are provided. Finally, we elaborate on patterns of individual experience observed during several games.

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Keywords: General, Project and People Management

1. THE PURPOSE AND CONTENT OF ADVANTIG

The implementation of technology is often a long, expensive and complex process, whereas we would like it to be short, inexpensive and simple. ADVANTIG has been designed to facilitate this process by enabling the participants to experience the complexity of technological innovation in a company-like setting. It addresses key problems such as cross-functional cooperation, communication and delegation aspects, and the limitation of planning and strategy making.
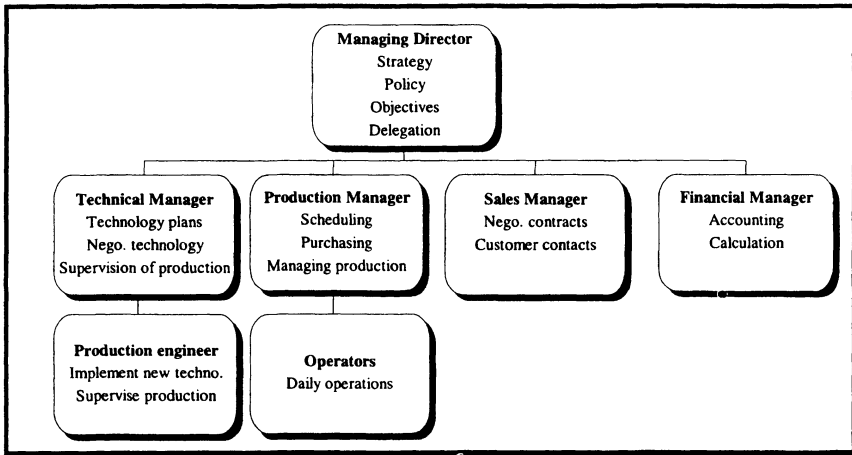
ADVANTIG is basically most helpful in diagnosis and planning and in team building. The ADVANTIG game constitutes a relative risk free environment in which the participants make and implement decisions about company strategy and technology deployment. The focus is on the relationship between making and implementing strategy and technology decisions, e.g. the management in the game may decide to buy and implement CNC at the shop floor to meet flexibility or quality demands either expected or imposed by a customer contract.

> **Origin of ADVANTIG**
>
> Designed by Dr. R. Duke, Patrick L. Sweet, John Morris, Jennifer Skwiertz, University of Michigan and Industrial Technology Institute, Ann Arbor, USA
>
> Language: English (manual translated to Danish)
>
> Available: Yes, on licence agreement, game operator training needed. Current price unknown.

1.1. Running the game

The participants are employed to run a water pump manufacturing company, supplying a major agricultural equipment producer, who is their only customer at the beginning. The pump company, called FLI Casting, is rather traditional, so the participants are facing many challenges as competition becomes harder, and they will have to meet potential challenges and concrete demands imposed on them from the customers.

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                        ┌─────────────────────┐
                        │  Managing Director  │
                        │      Strategy       │
                        │       Policy        │
                        │     Objectives      │
                        │     Delegation      │
                        └─────────────────────┘
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Technical Manager	Production Manager	Sales Manager	Financial Manager
Technology plans	Scheduling	Nego. contracts	Accounting
Nego. technology	Purchasing	Customer contacts	Calculation
Supervision of production	Managing production		

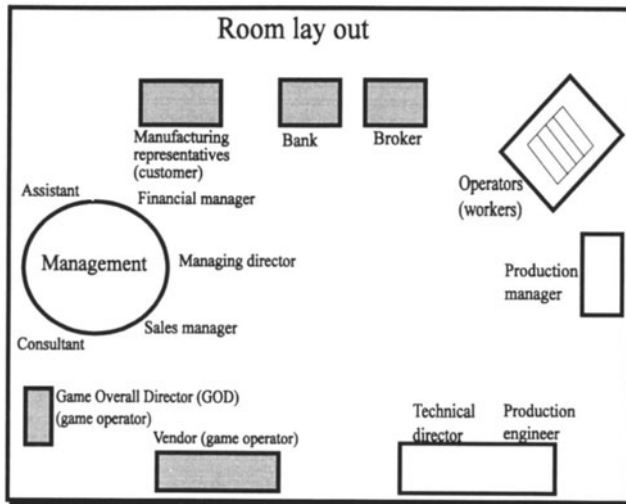| Production engineer	Operators
Implement new techno.	Daily operations
Supervise production	

A typical game run starts with the game operator stating the purpose of the game. This shall relate the game to the context in which the game is used. Then the game operator will introduce the company FLI Casting, the background and situation for when the participants start to control the company. The roles are then assigned voluntarily or according to a pre-game planned purpose, e.g. to reverse peoples everyday roles such as giving the sales manager the role of production manager.

The organizational chart describes the internal roles of the company and the main tasks related to those roles. Additional roles are Banker, Broker, Manufacturing representatives (representing FLI Casting's customers), Consultant and Vendor of Technology, who is also a game operator together with the Game Overall Operator (GOD). The game can be played by 10 participants occupying the core roles. However the game works better with 15 participants. Additional roles are obtained by adding more than 2 operators (workers), consultants, assistants to management and manufacturing representatives. After assigning the roles one of the game operators will give a "tour de FLI", briefly telling about the room lay out (see next page) and the artifacts of the game (shop floor, money, posters on the walls etc.). Then the participants will be asked to read through the

A typical game run (6-7 hours)
- Purpose of the day
- Introduction to the ADVANTIG company (FLI Casting)
- Role assignments (voluntary or controlled e.g., similar or reverse of everyday life)
- "Tour de FLI Casting"
  - layout and artifacts
  - flow of contracts
  - flow of materials
  - flow of money
- Read role descriptions followed by a round of presentations
- Scenario for the first "year" (year 3, year 1 and 2 are pre-game) of FLI Casting
- Start and run year 3 for 60 minutes
- Management retreat (meeting, 15 minutes)
- Scenario for year 4
- Run year 4, 40 minutes
- Scenario for year 5
- Run year 5, etc. etc.......
- Run year 7
- Debrief
  - "vent feelings"
  - start reflection process
  - realistic/unrealistic
  - major learnings, e.g. "what would you do different if starting all over again?"
  - turn to compare to realities in the company
- Compare to the objectives/expectations from the beginning

Room lay out

Manufacturing representatives (customer)	Bank	Broker	Operators (workers)

Assistant   Financial manager

Management   Managing director   Production manager

Consultant   Sales manager

Game Overall Director (GOD) (game operator)   Technical director   Production engineer

Vendor (game operator)

short role description and afterwards present themselves. The game operator proclaims a scenario for the first "year" of the game, which is year 3. Year 1 and 2 are pre-game years of which the participants have data available, e.g. economic and production operation data. The operator goes through the flow of the contracts that initiates and is a major trigger in the game. Then he will start year 3, which is a learning year running for 60 minutes. The following five years run 40 minutes and between each year there is a 15 minute management retreat at another location, where management can review and make plans. The game overall director will record the time, put pressure or help the company if necessary, announce management retreat and have the total overview. During the game both game operators will observe but only interfere if necessary. The observations will be used during the debriefing session after the game. The debriefing will normally follow a sequence of "venting feelings", reflection on marked game situations, through "major learnings" and comparisons to "real life". Further elaboration is often organized as group discussions dedicated to the purpose of the game run.

Example of: Post-game follow-up questions to be discussed in groups

Analyse the game and answer the following questions:

     Which problems did you face and how did you solve them?

     What were the most essential reasons for successes and failures?

Identify the means used to for making FLI Casting more efficient!

What would you do different with respect to the following aspects if starting ADVANTIG all over again:

     Organizing strategic planning, e.g. who should be involved? How should decisions be made?

     Collecting and disseminate information, communication between departments and between management and shop floor level?

     Decision on new technologies considering competitive advantages and strategic plans?

     Organizing and task delegation?

     Integration between departments?

2. APPLICATION AREAS AND CONTEXT

We have run the ADVANTIG game 40-50 times since 1989. The experience mainly differs according to two types of applications:

- **Teaching:** Strategic Management course for graduate engineering students of industrial management. Technology Management course for graduate business students. Post graduate courses for professionals from industry.

- **Companies:** Workshops or seminars for one manufacturing company or for a group of companies, and for a Technology consultant company.

In the following we will describe two examples, illustrating each of the two types of applications and typical experiences. The description draws primarily on Johansen et al. (1991).

2.1. Adapting to a new plant at Kosan Crisplant

Kosan Crisplant has 450 employees and produces machinery for refilling gasometers and separators for postal packages. Some years ago the company built a new and more advanced plant, e.g. more use of CAD/CAM and process automation. An important objective was to reduce the total order throughput time and the company wanted to involve the whole production in this process. ADVANTIG was applied at the beginning of this process to strengthen the cross functional and interdisciplinary cooperation and also to introduce a new production manager. Four work groups had been organized including supervisors, production control, process planning people and union organizers. An external consultant was also attached to aid the process.

The ADVANTIG seminar was planned by the game operators, the external consultant and the production manager. Twenty-three managers, supervisors, union organizers etc., and three game operators plus the external consultant participated from 9 AM until 9 PM. The 20 game players were given reverse roles in advance, e.g. the union organizer was the managing director. The game stopped at 3 PM and the following two hours were used for debriefing and discussions relating the game to the Kosan project. In the evening groups were organized to generate and discuss focus areas in the company's change process derived from the game experiences.

The subsequent evaluation of the seminar concluded that the benefits gained from the game were especially on the organizational and human side and less on the technology and planning side. The game facilitated breaking down barriers and provided knowledge and understanding of each others tasks. It illustrated the difficulties of cross functional cooperation and of effective information flow. It also visualised the need to dynamically adapt the organization as the work load and character change during a development process. Other conclusions were that the game can be successfully applied to many other disciplines in the company on different levels. It was stressed that the game cannot stand alone, it has to be part of a development plan, so that the participants can relate the experience from the game. The reverse roles helped to better understand the situation of other functions. In general the company found the game positive and beneficial and they have attempted to use other games.

2.2. A post graduate course in Managing Technological Change

Managing Technological Change is a post graduate course for professionals. The purpose is to promote an ability to relate technology to strategy and business, and to manage and facilitate technology acquisition and implementation. The course has 8 modules each of 3 whole days distributed over a period of 10-11 months. During this period teams of participants carry out projects in some of the companies they represent. The target group is functional or product managers and others directly involved in technological change. The number of participants is 10-15.

In the pilot run ADVANTIG was used at the beginning of the first module to reveal relevant course subjects based on their own industrial experience to customize the course. The second purpose was to motivate people to know each other. After some years of experience and development of the course the second purpose has become more important for the formation of project teams.

After two hours of introduction to the course and individual presentations the game started after lunch. The participants chose their roles themselves. The evening was spent on debriefing and discussion of the game, following no strict guidelines. Then the next morning the participants were placed in groups to discuss and identify key problems in managing technological change. The results were discussed in plenum.

The feedback from the participants was very positive, and that the mix of fun and seriousness dealing with subjects relevant to their professional life created a good atmosphere and provided a common point of reference during the course.

General "Key learning issues" from ADVANTIG

(Based on Industrial Technology Institute (1989)).

Functional integration - of company units

Planning and future thinking vs. fire-fighting

Strategic development and what drives it (money, markets, technologies)

Iterative nature of planning and implementation

Information gathering and sharing, and use of information in planning and action

Technology planning:Incremental vs. big leaps, long term acquisition plans, interdependencies, priorities

Engineering/production interface

Management on the shop floor, communicating, supporting

Task delegation (need and difficulties)

Need to make time for review and planning

Coordination across functions (who and how it gets done)

Decision making process (who, how, when)

Sensing the environment (getting, filtering, using information)

Maintaining external relations (bank, customers, suppliers)

Communication (meeting, directives, informal gatherings, retreats, top-down, bottom-up)

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3. PATTERNS OF INDIVIDUAL EXPERIENCE

The context in which the game is played is important to the degree of created individual tension and motivation. The participants are placed in a field between serious business training paid for as part of professional life, and game playing associated with leisure time where you buy relaxing excitement. The stress level depends on where the participants are in that field. However, one of the strenghts of games is to maintain a beneficial and delicate balance of fun and seriousness, a beneficial "serious fun" climate.

> He who just takes fun as fun,
> and seriousness as seriousness,
> has misunderstood both matters

Most participants immediately identify themselves with their roles and it is not necessary to do much "role-grounding". However, different individual emotional patterns have been observed during game sessions. One pattern may be similar to your first day at a new job or a job interview. For some participants Advantig will create similar feelings of uncertainty when the game operator claims "please start the game". Questions rise, like "What is being expected from me in this role?" and "Am I capable of doing this?" In this pattern participants begin with a high uncertainty level that is gradually decreased as the participants get acquainted with the game. This learning curve effect can be influenced by the role assignment. Assigning roles close to everyday life will speed up the learning.

Another pattern is that of stress level being heightened by all the tasks to do and the complexity faced by the participants under a severe time-pressure. When the pressure peaks the participant is forced to make decisions under great uncertainty or drop the reins.

Whenever appearing during the game, the feeling of being "out of control" stresses the participant into a situation of emotional tension and excitement. Goals and plans made by management become irrelevant due to the dynamics of the game or

> Communication is important,
> money is often short and
> the time is running....

they are simply forgotten or driven out by daily operations. We have experienced a student who claimed the day after the game that thoughts of what he should have done had kept him from sleeping for the whole night. Though fortunately less extreme, this kind of mood allows penetrating psychic barriers and generating energy to interact, discuss and learn.

4. CONCLUSION

ADVANTIG has its strongest effects in team building and as a diagnosis and planning tool. As a diagnosis and planning tool ADVANTIG is ideally suited for bringing together functional units to explore and share various perspectives regarding technological changes.

For companies the primary application regarding the time aspect, is before or at the beginning of a technological change process. It can help to gain better insight and understanding of the change process and to realize, predict, diagnose and plan what to do and not to do. The focus is on the cross-functional and managerial aspects, rather than on the technical issues.

The target group is general management, functional management, middle management, relevant staff personnel and union organizers. The number of participants is limited to 10-20 and the game is rather time consuming considering preparations and the time of two game operators for 6-7 hours to run the game. However, it is very important to spend time on bringing the game into a context.

ADVANTIG also facilitates many other processes, e.g. realizing the need for change, discussions of any cross-functional problems, preparing for implementation, discussions of potential solutions, and start of an organizational development process.

As a team building tool ADVANTIG is very suitable for enabling people to know each other or to develop existing relationships and to facilitate learning. However these advantages have a price as the game is not appropriate for providing specific skills or knowledge of technology and planning.

We think the experiential learning from ADVANTIG is multiple in the sense that the game comprises many aspects of enterprising and that various organizational aspects can be emphasized before, during and after the game.

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