

# Using a Fractal Enterprise Model for Business Model Innovation

Ilia Bider and Erik Perjons

DSV - Stockholm University, Stockholm, Sweden

[ilia|perjons]@dsv.su.se

**Abstract.** In their previous work, the authors have developed a new kind of enterprise model, called fractal enterprise model, that connects enterprise processes via assets used for running these processes. One of the possible usages of this model is facilitating innovation, more exactly, changing or extending a business model used in the enterprise. This research-in-progress paper presents the idea of how such facilitation could be arranged, and lists the problems that need to be solved in order to convert the idea into a practical methodology. The discussion is based on a hypothetical example.

**Keywords:** process architecture, enterprise model, business model, innovation, business transformation

## 1 Introduction

In our previous work [1], we have introduced a Fractal Enterprise Model (FEM) which has a form of a directed graph with two types of nodes *Processes* and *Assets*, where the arrows (edges) from assets to processes show which assets are utilized by which processes and arrows from processes to assets show which processes help to have specific assets in healthy and working order, see Fig. 1, 2 and 3 (in Section 2). The arrows are labeled with meta-tags that show in what way a given asset is utilized, e.g., as *workforce*, *reputation*, *infrastructure*, etc., or in what way a given process helps to have the given assets “in order”, i.e., *acquire*, *maintain* or *retire* the assets. Building a FEM is supported by a set of archetypes that show what kinds of assets are needed for particular process types and which assets they can help to acquire, maintain and retire. An archetype can be generic – applicable to all processes, or specific for some class of processes, e.g., acquiring stakeholders. Areas of applicability of FEM include, but are not limited to:

1. Finding “invisible” processes that exist/should exist in the enterprise or are related to a particular asset or process.
2. Arranging existing process documentation for better reusability, see [2]
3. Understanding interconnectedness of various parts of the enterprise, in particular, the multipurposeness of some assets and processes, see [3].

4. Assessing a proposed organizational change by pinpointing assets and processes that will be affected during intervention and showing how these are interconnected.
5. Preventing "organizational cancer" [4] when a supporting process starts behaving as though it were a primary one, disturbing the balance of the organizational structure.
6. Planning business model transformation, e.g., moving up in the value chain, as suggested in [5].

The objective of this paper is to present our current efforts for goal 6 – using FEM to support business model transformation/innovation. The topic of business model innovation became popular with the appearing of the business model canvas [6]. However, the canvas helps only in developing/depicting an existing or new model, but does not support the process of transforming an existing model into a new one that should substitute the existing model or be a complement to it. Such transformation is done in an ad-hoc manner based on intuition. With such an ad-hoc type of transformation, there is a risk that a new model has no relation to the old one and does not take into consideration the capabilities and assets that already exist in the organization in question. As a result, a new model could be difficult, if ever possible, to implement.

The approach to business model transformation/innovation suggested in this paper consists of two steps: (1) generating hypotheses, and (2) assessing promising hypotheses. The first step is based on analyzing which asset(s) should be used in a new business activity. The second step consists of comparing a FEM for a new business activity with the FEM for already existing one, and assessing the differences. The paper presents the ideas of how these steps could be completed via using an artificial example in Section 2, which is followed by a discussion of current directions of our research in Section 3.

## 2 An Example

Consider an example, inspired by Amazon, of an enterprise the primary business of which is selling books over the internet. The business goes quite well, and the company decides on expanding its operations, but in another area. They need to generate hypotheses on what strategic direction to take, analyze them, assess the size of a change to be introduced, and create an implementation plan. In essence, the task of management is to develop and implement a new business model in addition to the already existing one, using as much of the existing organizational assets (capabilities) as possible.

Generating hypotheses can be started with creating a limited part of a FEM model, e.g., its upper level, to identify assets/capabilities that could potentially be used for developing a new business model. An example of such FEM is presented in Fig. 1 that shows a part of the topmost level of FEM with a *book sales process* as the root and four assets supporting the process. Note, however, that this is not the full set of assets needed for the primary process, if needed, others, e.g., a stock of books, could be added.

Generating and deliberating hypotheses based on Fig. 1 could be done in the following manner:

1. Focus on the asset *Private customers*. Question: Can we sell something else to the same customers over internet using the same software and deployment platform?

The answer depends on the size and saturation of the market for particular products. It might be too difficult to get a market share if the competition is hard.

2. Focus on the asset *Packing and delivering staff*. One possibility is to provide stock management, packing and delivering services for a bigger book-seller. However, it could be difficult to combine this with the company's own book selling business.
3. Focus on the asset *Webshop software*. The Webshop software could be licensed to other book sellers, but it would result in helping the competitors.
4. Focus on the asset *IT platform for Webshop deployment*. The platform could be provided as a general IT deployment platform. The market for such services is on the rise, and there is no direct risk of helping competitors in the book-selling business.

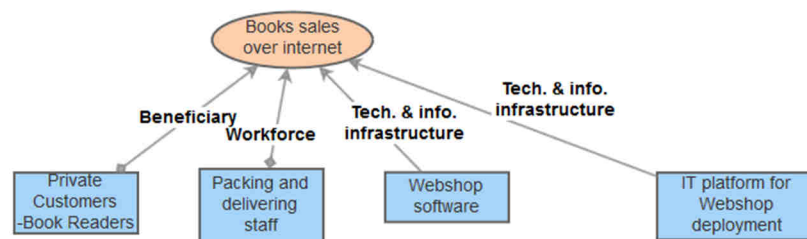


Fig. 1. The upper part of FEM

After considering four alternatives above, one or more could be chosen for further analysis. Assume, for example, that the last alternative has been chosen, then the *IT platform* asset is moved as a node in a hypothetical new FEM tree and is expanded upwards and downwards, as shown in Fig. 2. Expanding up consists of adding a root of a new FEM tree which is *IT platform for deployment as a service*, where an asset *IT deployment platform* becomes an *infrastructure* asset to the new service process. Note that this asset is not exactly the same as in Fig. 1. In Fig. 1, the deployment platform is specific for the webshop software, while in Fig. 2, this is a general platform for deploying customers' software. Normally, such platform includes a virtual server, an operating system, one or more DBMS's, one or more webserver software, etc.

Expanding down means adding more assets to the root, and continuing the expansion of the assets by adding process nodes aimed and managing these assets. In particular, a *beneficiary* is added as an asset to the root, and processes aimed at managing asset *IT platform for customer deployment* are added to this node as well. The processes' nodes are further expanded by adding the asset *Platform specialists* as *Workforce* supporting these processes (see Fig. 2).

At the next step, we need to compare the assets and processes in the old FEM tree (Fig. 1) with the ones in the new FEM tree (Fig. 2), expanding these trees as required. The comparison is presented in Fig. 3 where both FEM trees are presented and links between similar assets and processes are drawn. The figure helps to discuss how much

of the existing processes and assets can be (re)used in a new business activity and how much needs to be built from scratch.

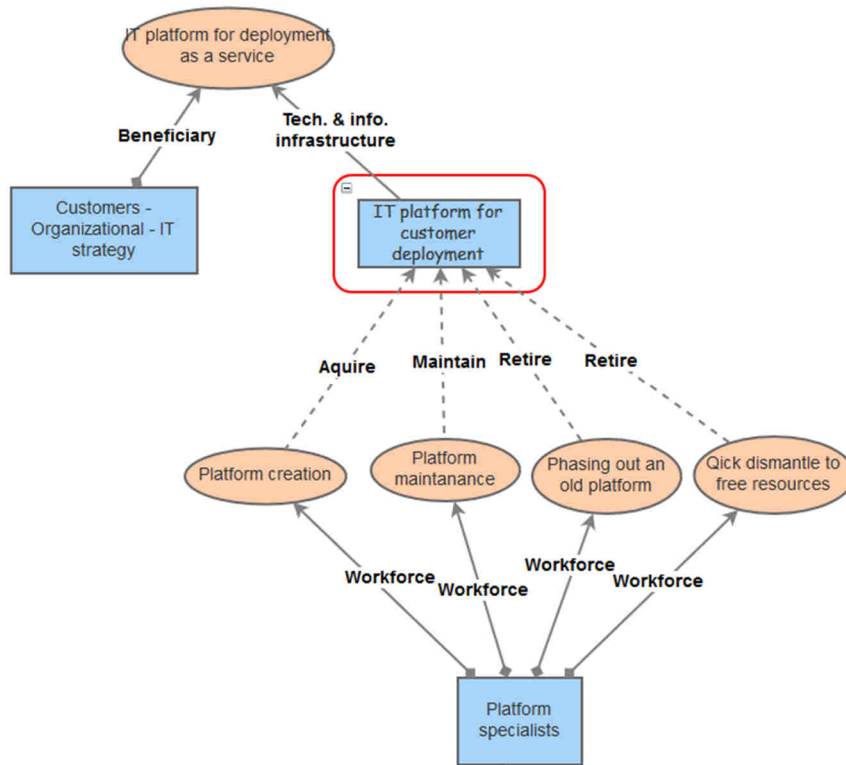


Fig. 2. Building a new FEM tree

The differences between components of the existing and new FEMs are presented in Fig. 3 as green dashed “horizontal” arrows. The green dashed “horizontal” arrows have labels that explain the differences. More explanations are presented below:

- *Beneficiary (customer)* asset. As we can see from Fig. 3, the customers for a new business (on the right) are not the same as the customers for the existing business (on the left). The former are enterprises/organizations that rent an IT platform to run their own applications, while the latter are private customers who like reading books. Thus a new set of processes to manage the new sort of customers is to be built, starting with sales and marketing processes to acquire new customers. However, some help for acquiring new customers could be obtained if we assume that decision makers in an organization are often book readers, and may have used the webshop in the past. As the webshop is user friendly and fast, there is a *Reputation* asset that supports the *Customer retention* process in the existing FEM. For those decision makers who have experience of buying books via the webshop, this reputation can be of value when deciding to use the general IT platform service. Therefore, reputation *Excellent technical platform based on customer experience* could be moved

from the left hand side of Fig. 3 to become an asset to the *Sales and Marketing* of the new FEM, on the right side of Fig. 3.

- *Infrastructure* asset related to the deployment platform. As has already been mentioned, the platform for delivery as a service has a more general nature than for deployment of webshop. Some components need to be added and some deleted. In addition, for the webshop it is enough to have one platform which has enough power. In the new business, each customer gets its own platform, and the power can vary from platform to platform.
- Processes that manage the asset *IT platform for customer deployment* (i.e. the processes acquire, maintain and retire) have different nature than the ones that manage asset *IT platform for Webshop deployment*. For example, there is a need to create a new platform very quickly, as well as dismantle it quickly.
- The difference can happen on the next levels of FEM tree as well. For example, the new business activity may require more *Platform specialists*, thus the *Hiring* process may need to recruit more personal each year than the existing process.

### 3 Research directions

The example from the previous section shows that FEM can be used for generating hypothesis and assessing them already today. However, the process is rather cumbersome with many manual steps and ad-hoc decisions. To ensure adoption of the approach by practice, the approach should be converted to a structured methodology with tool support. This, in turn, will require extension of FEM and building a computerized tool.

#### 3.1 Extending FEM

The hypotheses generation step could be facilitated by a set of transformational archetypes. Such an archetype shows how to use an asset(s) further down in the existing FEM tree to create a new FEM tree based on that asset. As an example, the last two hypotheses considered in Section 2 can be considered as belonging to the archetype "Using an infrastructural asset for building a service of providing this asset to external customers". In this case, a "supporting" asset becomes the main one on which the new business activity rests. This transformational archetype is visualized in Fig. 4.

Other examples of transformational archetypes could be as follows:

- *From manufacturer to designer*: instead of manufacturing and selling own products, the company designs products for others. The new model can substitute the old one, but can also be used as a complement.
- *From designer to manufacture*: having a good design capability and an idea of a new innovative product results in starting manufacturing and selling the product. Note that this transformational archetype is a reverse to the previous one.

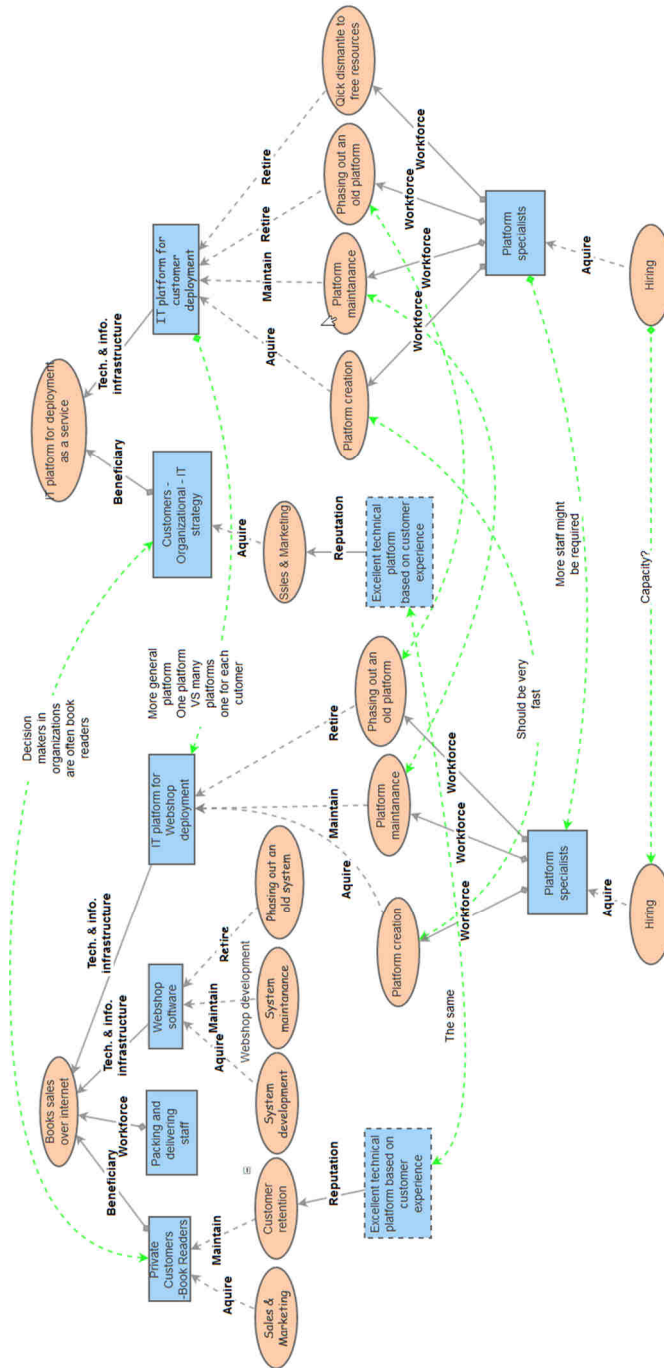
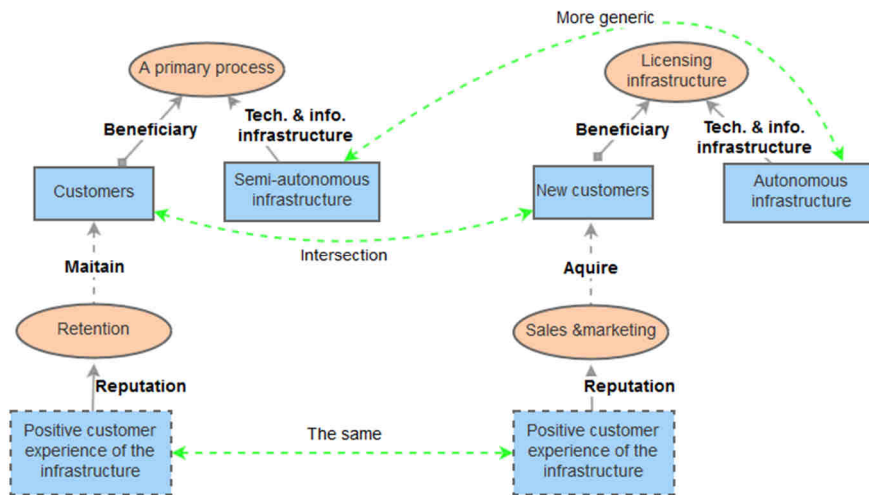


Fig. 3. Comparing Two FEM trees

- *From educator to consultant*: an education activity in a business/technical topic can be transformed to a consultant activity in the topic. This transformation is based on the asset of the type *Workforce*. Instead or in addition to being teachers, the workers become consultants.
- *From consultant to educator*: a reverse archetype to the previous one.



**Fig. 4.** An archetype for becoming an infrastructure provider (generalization of Fig. 3).

Our plans regarding transformational archetypes include creating a list of possible transformational archetypes, formalizing them and finding historical examples where each archetype has been successfully implemented.

The hypotheses assessment step could be facilitated by extending FEM with qualitative and quantitative characteristics of its nodes, so that it would be easier to compare nodes in the existing and new FEM. Both processes and assets nodes could be quantified and qualified. For example, processes nodes could be quantified with:

- Number of process instances completed per a time unit (year, month, or day) – max, min, average.
- The average life length of the process instance.
- Number of process instances that run in parallel – max, min, average.

It might be more difficult to quantify assets nodes. The measures for these nodes could depend on the asset type. For example:

- Assets of type *stakeholder*, e.g., *beneficiary* (customer), *workforce*, etc. can be measured as the number of stakeholders

- Assets of type *stock*, can be measured in stock units, e.g., a number of products of a certain type
- Assets of type *infrastructure* can be measured in the number of units, the total power, production capacity, etc., dependent on the type of assets.
- Assets of type *reputation* can be measured on a fixed scale, like *weak*, *medium*, *strong*.

Besides quantitative parameters, both processes and assets could be characterized with qualitative parameters for which the comparison operators, like ">" and "<", are not applicable. For example, a process can be characterized by its level of flexibility, e.g. according to the classification introduced in [7]: *loose*, *guided*, *restricted*, and *stringent*. Assets of the type workforce could be characterized by its level of qualification.

### 3.2 Providing tool support

Manual drawing of FEM diagrams and linking them together is a tedious work that could be facilitated by developing a computerized tool support. Such support would include at least the following components:

1. Support for building a FEM based on the generic and specific archetypes suggested in [1].
2. Support for transforming an existing FEM into a new one based on the transformational archetypes discussed in Section 3.1
3. Support for calculating the differences between the nodes of two FEMs based on quantitative and qualitative parameters discussed in Section 3.1

As our suggestions are aimed at facilitating hypotheses generation and analysis, it is of utmost importance for the tool to have user interface suitable for team work. A team working with a large screen should be able to instantly make changes in the model, add notes, save work for further consideration, compare two hypothesis, etc. Currently we are testing ADOxx environment [8] for building tool support. Fig. 5 shows implementation of item 1 on the list above when an archetype is applied to a primary process.

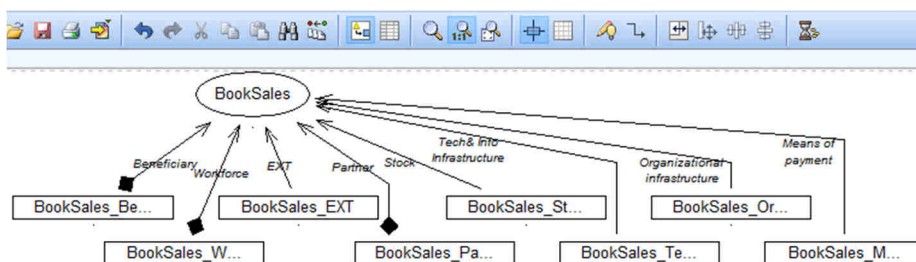


Fig. 5. The result of applying an archetype to a process (ADOxx based test)



## 4 Areas of application

To discuss the area of application of the ideas presented in this paper, we will consider five levels of strategy work introduced in [9]:

1. Doctrine or policy, which defines who we are.
2. Infrastructure/capability, which defines what infrastructure/technology we should use in our business, and what capabilities we need to develop.
3. Grand strategy, which defines in which sector to operate and with whom to make alliances.
4. Strategy, which defines our structural coupling with the external world, e.g. competitors, collaborators, market. The questions to decide here are whether we are part of a heard, a heard leader, an independent, etc.
5. Tactics, which defines operational levels procedures.

The work presented in this paper, in the first hand, is aimed at supporting the strategic work on the level of doctrine/policy by providing assistance in generating and assessing the hypothesis of extending or radically changing the doctrine/policy (who we are). In the example discussed in Section 2, the policy has been extended from being a book seller over internet to a platform provider. The suggested approach can also be useful for moving from doctrine/policy changes to infrastructure/capability level, as it helps to determine which capabilities are already in place and which needs to be developed. It is doubtful that the approach could assist to work on a grand-strategy level. However, a FEM model of an enterprise might be helpful on the strategy level as well, as the choice of strategy depends on the qualitative and quantitative characteristics of various processes and assets already in place or to be developed. Explicating the connection between FEM and strategy level patterns as defined by [9] is included in our plans for the future.

In the example discussed in Section 2, a new business model is developed as an addition to the existing one. Though such case is possible, we believe that a change in the business model, and hence our work, is more important in a situation when a company's current model becomes outdated, and needs to be substituted with a new one in order for the company to survive. In this case, the Boyd's idea of destruction and creation from [10] needs to be applied. This is done by decomposing the current company into interconnected set of capabilities, i.e. processes and assets (analysis), and composing them in a different manner while applying some twisting to get them fit in a new scheme of things (synthesis).

## 5 Concluding remarks

In the previous sections, we have demonstrated how FEM could be used for business model innovation/transformation, and what needs to be developed to convert the idea into a practically feasible methodology with tool support. Due to the space limitations

we are not able to provide any additional details of our research. It is worthwhile to mention, however, that our research follows the design science approach. Therefore, besides working on the issues highlighted in Section 3, we are putting efforts to disseminating the ideas among management consultants working with the issues of business transformation. An example presented in Section 2 has been developed as part of the dissemination efforts, and it showed to be helpful for this end, when demonstrated as a story in InsightMaker [11], see <http://bit.ly/2qakWJR>. Also, the current text has been used as a means for transferring the message to the expert in the field to get the ideas validated.

**Acknowledgements.** The authors are grateful to Patrick Hoverstadt for valuable comments on the draft of this paper.

## References

1. Bider, I., Perjons, E., Elias, M., Johannesson, P.: A fractal enterprise model and its application for business development. *Softw Syst Model* (2016)
2. Josefsson, M., Widman, K., Bider, I.: Using the Process-Assets Framework for Creating a Holistic View over Process Documentation. In: *Enterprise, Business-Process and Information Systems Modeling, LNBIP V. 214*, pp.169-183 (2015)
3. Elias, M., Bider, I., Johannesson, P.: Using Fractal Process-Asset Model to Design the Process Architecture of an Enterprise: Experience Report. In : *BPMDS 2014 and EMMSAD 2014, LNBIP 175, Thessaloniki, Greece*, pp.287-301 (2014)
4. Hoverstadt, P.: *The Fractal Organization: Creating Sustainable Organization with the Viable System Model*. John Wiley & Son (2008)
5. Henkel, M., Bider, I., Perjons, E.: Capability-based Business Model Transformation. In : *Advanced Information Systems Engineering Workshops, LNBIP 178, Thessaloniki, Greece*, pp.88-99 (2014)
6. Osterwalder, A., Pigneur, Y.: *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley, Hoboken, NJ,US (2014)
7. Bider, I., Kowalski, S.: A framework for synchronizing human behavior, processes and support systems using a socio-technical approach. In : *BPMDS 2014 and EMMSAD 2014, Thessaloniki, Greece*, pp.143-157 (2014)
8. ADOxx. (Accessed 2017) Available at: <https://www.adoxx.org>
9. Hoverstadt, P., Loh, L.: *Patterns of Strategy*. Taylor & Francis (2017)
10. Boyd, J. R.: *Destruction and creation*. Lecture presented to the U.S. Army Command and General Staff College (1976)
11. Give Team: Insightmaker. (Accessed 2014) Available at: <http://insightmaker.com/>