Enterprise Design – a practice-driven response for generating and implementing business models

Report of the Forum session at EEWC-2018

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Abstract. The increasing volatility and complexity of business models call for a fast and yet robust approach to continuous transformation. Enterprise Design is an emerging and practice-driven response for generating and implementing business models, while integrating innovative and disruptive Information Technology. At a limited scale, practical experience has been gained in several industry environments. To establish a research program to further enhance, develop and mature Enterprise Design, a ½ day Industry-meets-Academia forum on Enterprise Design was conducted, exploring the strengths and weaknesses of this approach, and seeking for opportunities for further research collaboration with industrial relevance. It appeared to be crucial to further increase the speed and robustness of transformation by a gradual expansion of the metamodel of the ED approach, continuously applied on real-life cases (e.g. supported by low-code platforms). Also of major relevance is the creation of a governance model for Enterprise Design that is able to handle interventions in the context of disruptive innovations; also these governance models should be applied and monitored in real-life cases to establish best-practices in timings, iterations, order of working and the relationship with achieved benefits.

Keywords: Enterprise Design, Enterprise Engineering, Organization Implementation, DEMO, Agile

1   Introduction

The increasing volatility and complexity of business models call for a fast and yet robust approach to continuous transformation. Indeed, both the change is continuously accelerating (reacting on more frequently occurring disruptions) and the complexity of changing collaboration networks [3] (with its many parties and many potential dimensions of collaboration) is growing. So also the need is

rapidly increasing for just-in-time and just-enough underpinned decision making about the best direction of the enterprise [15].

Many elements for such decision making - mainly focusing on the process of change - have been contributed already from schools of organization science, product-portfolio-program-project management, architecture and business analysis, also informed by agile and DevOps initiatives. The main thing missing is integration of the different elements from a content perspective into a holistic approach – especially in the positioning and scoping of change, where strategic directions should propagate in choices for products and services and effective collaboration, which in turn has to be done in an efficient way. And this not "once and for all" but continuously, whenever strategic directions change, or new implementation technologies emerge, or new parties offer more attractive capabilities, etc. As long as such an integration from a content perspective hasn't been achieved, true agility cannot reasonably be expected.

As an emerging and practice-driven response for generating and implementing business models, the Enterprise Design (ED) approach has been developed and applied at a limited scale in several industry environments. From a content perspective, ED integrates concepts from ontology about stability and variance with emerging insights from Lean Startup and Business Model Generation, while integrating innovative and disruptive Information Technology with at the same time clear human accountabilities. From a transformation process perspective, ED presents well defined iteration points, a clear logic for deriving business cases from the design of alternative Target situations and their roadmaps, and an approach to combine elaborations of single change alternatives into multi-case and multi-year plans. Practical experience with ED was gained in several cases, varying from a small (3 month) Lean StartUp, a project at Dutch Tax Services by an Executive Master student of Antwerp Management School, to the starting of multi-year / multi-party programs in complex organizational networks.

Next to gaining practical experience with ED, a test against the Body of Knowledge of Enterprise Engineering – integrating Organization Science and Information Science [6, 7] – is necessary to find out to what extent the intended integration from a content perspective has been achieved already. This was done by conducting a ½ day Industry-meets-Academia forum on Enterprise Design at the 8th Enterprise Engineering Working Conference (May 28th -June 1st 2018, Luxembourg), aiming to establish a research program to further enhance, develop and mature Enterprise Design, to explore the strengths and weakness of this approach, and to seek for opportunities for further research collaboration with industrial relevance.

From the session, in which three teams elaborated intensively on the themes purpose, approach, people, decision-making and external validation, a total of 14 research questions emerged. The highest priority from a content perspective was assigned to ensuring consistency between several elements of Enterprise Design (e.g. between Strategy, Product Definition and Enterprise collaboration - intention) by strengthening ED's metamodel. The highest priority from a process perspective was given to creating a governance model for (if necessary: federated)

Enterprise Design, also able to handle interventions in the context of disruptive innovations. This leads to adopting a research agenda with a focus on continuous faster transformation, based upon (a) a gradually expanding ED metamodel that is continuously applied in practical cases (e.g., using low-code platforms) [12], and (b) studied empirical cases to establish best-practice timings, iterations, order of working and the relationship with achieved benefits.

The remainder of this forum report is structured as follows. Section 2 summarizes the artefact presented at the forum session, explaining the Enterprise Design approach, and instructing the forum members on the way of working during the forum session. The feed-back thus obtained from the forum session is elaborated in Section 3. Finally Section 4 provides the conclusions of this forum session by the authors, as well as directions for further research.

2   Artefact presented at forum session

The artefact presented at the forum session is the presentation "Enterprise Design – a practice-driven response for generating and implementing business models[5] It starts by making explicit the goals and expected outputs of this session, namely to test and validate the steps in the proposed Enterprise Design approach (e.g., completeness, consistency and required depth) and to find opportunities for further and collaborative research in the Enterprise Engineering community. Then the reasons for the Enterprise Design approach (as elaborated here in Section 1) are summarized: to enable continuous transformation – fast and robust – in a context of increasingly volatile and complex business models. Next the content of the Enterprise Design approach itself is explained – its individual elements and their mutual coherence – with the well-known pizzeria-case as running didactical example. Finally the assignments for the workshop part of the forum session are formulated, in which each group was asked to bring up research questions and to prioritize these in terms of academic and industry relevance.

We will now summarize the content of the Enterprise Design approach, zoom in on one example of a typical coherence perspective in ED (namely: the derivation of a business case), and phrase the assignments given at the forum session.

2.1   Summary of the Enterprise Design approach

The Enterprise Design approach consists of 11 basic elements – each represented by a rectangle in "The Enterprise Design diabolo" (Fig. 1). In the figure, each element is named according to its goal and result (black font in the figure, such as *Strategic Fit*). Some elements are accompanied by a recommended technique

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[5] See the handout of the complete presentation used at the forum session itself [18]. See also the practitioner oriented video-explanation of the content of the Enterprise Design approach in the 40 minutes webinar "Enterprise Design: Engineering the stable essence to vary on adaptation" – with the pizzeria-case as running example, and continuously illustrated with real-life examples at the National Agency of Water, Roads and Infrastructure (Rijkswaterstaat, Netherlands) and Shell) [17].
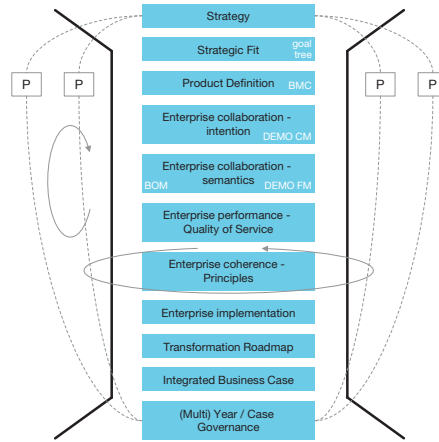
Fig. 1. The Enterprise Design diabolo

(white font in the figure, such as *goal tree*). The first part of the ED approach (upper in the figure, with *Product definition*, *Strategy* and *Strategic fit* and the small horizontal squares with a $\boxed{\text{P}}$ for each separate Product) is on Product portfolio level; it typically focuses on defining different products and choosing which of these alternative products fit best in the Strategy. The second part of ED (in the middle of the figure, the narrow part of the diabolo, from *Enterprise collaboration - intention* until *Integrated Business Case*) focuses on everything needed to be able to deliver one product. In the third part of ED (lowest in the figure, with *(Multi) Year / Case Governance*), the focus is on Transformation Portfolio level, widening the perspective across many products to programs and projects to deliver the changes needed. The product focus of the second part of ED is partly broken, especially in the element *Enterprise coherence - Principles* (indicated in the figure with the horizontal ellipse with arrow), since principles tend to have authority across many products, processes and technology. Finally, ED comprises the notion of iteration (indicated in the figure with the vertical ellipse with arrow) – in practice experienced especially from Product Definition back to Strategy, from Enterprise implementation back to Quality of Service, from Integrated Business Case to Quality of Service, and from (Multi) Year / Case governance to Product Definition.

We will briefly illustrate how ED works in the well-known pizzeria-case [4], and start with Product Definition. Assume that Mario's pizzeria considers starting home delivery, then the feasibility and assumptions can be explored, for instance by using the Business Model Canvas (BMC) [21]. Home delivery is ex-

pected to attract new customers, which in Strategic fit is connected to Mario's Strategy "broadening customer base", using a goal tree. On Product portfolio level, the home delivery idea is given green light, after comparing its strategic contribution with other ideas, such as giving serenades at home and countering the competition with the pizza *sexto stagioni*. Taking the rough ideas from the BMC, Mario's crew now systematically designs the network of *Enterprise collaboration*, on the level of *intention* (defining results and accountabilities), needed to do home delivery. For that, the existing collaboration network is extended (see blue rounded rectangle in Fig. 2 for its expression in a DEMO Construction Model) by introducing a new actor role, namely order transporter (A04), to be accountable for sale transporting (T04) on initiation by the sales completer (A01). The actor role order transporter also needs new data, such as the customer's address and the navigation map. This requires that also *Enterprise collaboration* on the level of *semantics* is designed: what does Mario's pizzeria understand by customer's address (or should it actually be delivery address), and is "order" the same thing we always meant when baking the "order" in-house (in T03) until now?

To enable dimensioning choices, Mario now also has to define the intended *Enterprise Performance – Quality of Service* of the home delivery – how many orders (peak, average) should the pizzeria be able to deliver, with with quality (temperature, crispness) and (predictability of) speed, and in which geographic locations? Now before thinking about implementation alternatives with different mixtures of organization and technology, it is important to become aware of boundary constraints for that; so what *Principles* – as conscious restrictions in design freedom to further *Enterprise coherence* [5] – should apply or get another weight? Does "life-cycle transparency of every pizza" (until the lives of the specifically identifiable cow and pig in the salami on this individual pizza) need specific measures in home delivery, and what does the principle "customers de-
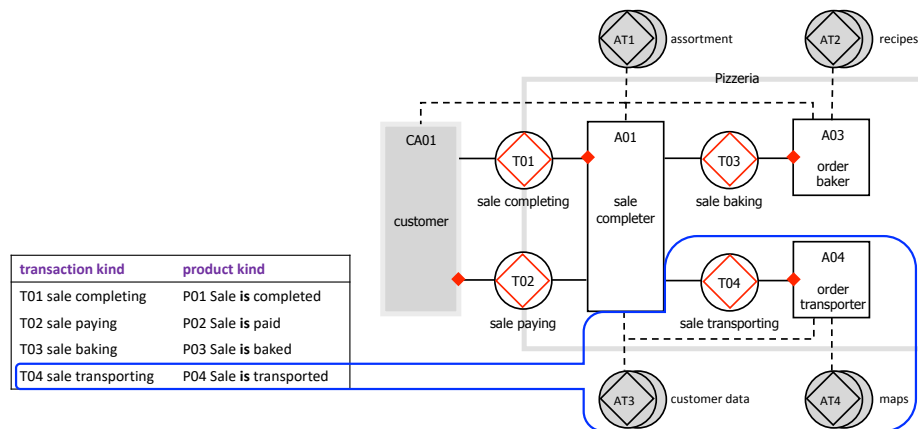

Fig. 2. Change in Enterprise collaboration – intention, needed for home delivery

sign their own pizza" mean in the context of home delivery? Then Mario's crew can turn to concrete organizational and ICT *Enterprise implementation* alternatives, mixing people and means according to Organization Implementation Variables (OIVs) [12,16]: shall we use own (how many?) hired transporters (and if so: lease, buy or borrow their scooters in the Minimum Viable Product of home delivery) with navigation apps fed by the correct delivery address automatically, or use a transporting company; and should the customer pay (using cash, cards, bitcoins, etc.) before or after delivery? (Notice that the DEMO Model remains stable in all these implementation alternatives.) For selected implementation alternatives, now *Transformation Roadmap*s need to be drafted: who and what needs to change, and who is going to do that & when? For instance, educating Mario's crew and hiring new crew members, contracting the purchase of scooters and navigation apps, and connecting the order system with the navigation app. To support the decision making whether indeed to go into home delivery business, an *Integrated Business Case* is drafted, which reckons with the benefits and recurring costs of future operations (RUN) and the one-off costs of transformation (CHANGE) it requires. After making the choice to go ahead with home delivery, the initiative is embedded in *(Multi) Year / Case Governance* with the other programs and projects, such as the projects for home-serenades and increasing crispness. Of course, iterations have been made all the way; for instance when it appeared that new hiring of transporters would take a few months because of legal stuff, first a pilot with 2 friends of Mario using their own scooters was introduced as an (Minimum Viable Product) implementation alternative, with the more modest Quality of Service of only serving the campus area.

### 2.2   A typical ED coherence perspective: deriving the business case

As an example of a typical research question on coherence, Fig. 3 on the logic of business case derivation was presented to the forum session participants. This diagram shows the same elements as in the diabolo (Fig. 1) – this time numbered – with an example elaboration per ED-element, complemented with an overlay of some of the possible coherence links in ED in different colors.

Take as a starting point the Value Proposition, as described by the Business Model Canvas (BMC) (3) in the *Product Definition*. This BMC discerns 2 sides: what is the offer [proposition] and what is the value it will deliver for customers. The value part is specified further in a yellow storyline, the proposition part in a blue storyline. The horizontal bottom part of the BMC addresses the costs and revenues expectation of the value proposition and can be considered as a first draft of the business case – the red storyline.

Following the value storyline (in yellow) starts with the value side of the BMC. The assessment needs to happen to what degree the value expectations do fit in the existing business strategy (2) or whether the business strategy needs further enhancements (1). This value is translated in quantitative and/or qualitative benefits, as a part of the Integrated Business Case.

Following the proposition storyline (in blue) starts with the left hand part of the BMC (3), providing the main context for the construction of the *Enterprise*
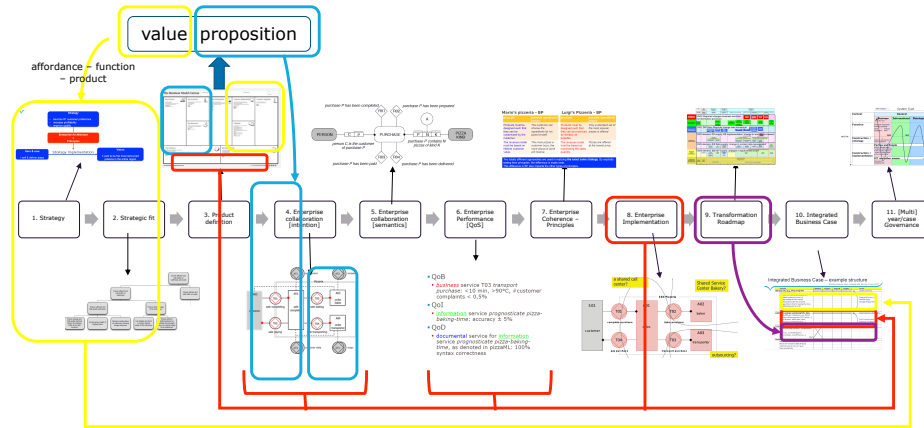
Fig. 3. Example relations in Enterprise Design, related to the Integrated Business Case

collaboration - Intention (4). The identification of key activities, key resources and key partnerships as per BMC will drive the further definition of roles and responsibilities, services and dependencies in the DEMO Construction Model, to be elaborated later on in processes.

The main financial storyline (red) starts from the cost and revenue structures in the BMC (3). The first refinement of the cost structure is done by elaborating the set-up of collaboration in the value chain, and in the identification of roles and activities in the DEMO Construction Model (4). In Quality of Service (6), decisions on the expected or required performance are made, which will influence both the operational costs and the revenues. Finally, after making the implementation choices (8) on man/machine/location/instances/IT, the total of operational costs (RUN) will become more visible, ready for inclusion in the Integrated Business Case (10).

To achieve the depicted future state, we follow the transformation storyline (purple). With the decisions from the implementation roadmap (9), the approach for realizing the transformation becomes more tangible, as well as its associated costs. The costs of transformation (CHANGE) are included into the Integrated Business Case (10), which completes it from both RUN and CHANGE-perspective.

Reflecting on these storylines raises some interesting questions. Indeed a coherence between ED elements is drafted here. At the same time, the individual elements have been taken from different 'schools' of thinking, which do not necessarily relate to a similar understanding of concepts – even if they use the same term. Are the yellow, blue, red and purple overlays really 'true', and is there a seamless coherence in each of them? Is the coherence compelling, 'watertight', and complete?

This could lead to research questions such as:

1. What main topics/storylines can be identified in the ED - set up in analogy with the yellow / blue / red / purple storylines – ultimately covering all components in ED?
2. In such a depicted topic, is there a seamless coherence – in a way that there is full and complete logic in the decisions that need to be taken?
3. How fixed is the sequence of the 11 ED elements - can you or do you need to vary the sequence in working the transformation project, because of the nature of disruptive innovations that need to be dealt with?

Detecting these types of research questions, that is the aim of this forum session.

2.3   Assignment to the forum sessions participants

The following assignment for the one-hour workshop part of the forum session was given to the participants:

> On the theme(s) chosen by your team, produce a list of research questions and add to each question an indication of relevance/priority, both from an academic and an industry perspective. Prepare a plenary feed-back, in which questions for understanding can be asked.

Participants could freely choose from the following 5 themes, and compose teams based on their choice (as long as the resulting teams would have a minimum of 3 and a maximum of 6 participants):

1. External validation/consistency: what is the relationship with other methods and what is the market validity check; does the approach serve the purpose that businesses need in times of disruption and digital transformation?
2. Internal consistency, completeness, redundancy – ...
    a ... from a People perspective
    b ... from a Purpose perspective
    c ... from an Approach perspective
    d ... from a Decision making perspective (e.g. why make a complete Business Model Canvas (BMC)? answer could be that the goal is mainly to create a dialogue between different disciplines, to build enthusiasm, involvement and support, to recognize commonality together, and to build a more robust decision making)

Finally, the participants were asked the takeaway question: "What do you consider to be the key potential of Enterprise Design?"

3   Feed-back on the artefact from the session

In the workshop part of the forum sessions, the 3 teams were constituted as follows:

Table 1. Output from team A: purpose

item	industry priority / relevance	academic priority / relevance	research questions
P1 Are the ED steps small enough in time, so that is is still feasible to look back (for instance, to reconsider the strategy)?	6	6	Q1
P2 How to support matching sub-strategies in encompassing strategies, as in the case of federated entities sharing a global purpose?	5	5	Q2
P3 In the case of federated entities sharing a global purpose and strategy: how to keep the global coherence in *Enterprise collaboration - intention* and *Enterprise collaboration - semantics*?	4	3	Q2, Q3, Q4
P4 Does the methodology allow splitting up to a number of entities when they do not align in Strategy?	3	4	
P5 Does the methodology allow checking alignment between elements? How?	2	2	Q3, Q4, Q5
P6 Does the methodology allow for entry points triggered by external (and internal) factors allowing interventions (on e.g. Transformation, but can happen any time) as it happens / runs? And how to handle that, e.g., go to start / continue & adapt on-the-fly / drop everything?	1	1	Q5, Q6

A. team "Purpose" (theme 2b), consisting of 3 persons;
B. team "Approach" (theme 2c), consisting of 4 persons;
C. team "various", covering external validation/consistency (theme 1), and Internal consistency / completeness / redundancy from a People perspective (theme 2a) and from a Decision making perspective (theme 2d), consisting of 4 persons.

The remainder of this chapter first provides the feed-back given by these 3 teams, followed by the plenary given answer on the takeaway question. Each part starts with the received input (where appropriate, rephrased by the authors for readability, most of the time in dialogue with participants after the forum session) and ends with a reflection from the authors in terms of underpinned research questions and its relation with the team-input.

3.1 Team A: purpose

Based upon the output from team A (Table 1), the following candidate research questions have been formulated. The scale applied is: 1 = highest priority/relevance, 6 = lowest priority/relevance.

Q 1 *What are reasonable durations / net times for all ED elements – and why?*

Clarification. The question is inspired by P1. A reasonable durations / net time will determine its (experienced) value and validity. E.g., it should be become clear: should the preferred duration of one complete EDF cycle be typically 2, 4, 6 weeks? And/or should one complete ED cycle be split up in 3 parts (the first one containing at least strategy / strategic fit), followed by a reflection part – comparable with recoding / refactoring in software development?

Q 2 *How to ensure inter-entity consistency, i.e. consistency for ED-elements of the same type (e.g. the Strategy or the Product Definition) between different entities (such as departments)?*

Clarification. The question is inspired by P2 and P3. Following Goldrath's Theory of Constraints [9]: it makes no sense to optimize one single link; optimization only works when looking at the whole. So (using the ED-element *Enterprise Performance – Quality of Service*) when your goal is to minimize the duration of helping a patient in the hospital (involving all disciplines in one run), then optimizing the utilization of blood testing equipment does not necessarily contribute to that. Or the question is: how are the strategies of collaboration partners optimized in relation to the strategy of the whole? Practically speaking: is the ED-method only applied on each collaboration partner separately, only on the whole, or both?

A formalization of this question could include the following. Suppose one entity A (e.g. division of a corporate) is going to be split up in 4 smaller entities A.1 until A.4 (e.g. 4 departments). What will be the relationship between several instances of a certain ED-elementtype, e.g. the Construction Model (CM) of A and A.1- A.4? For instance, (when) could the following be true: $CM(A.3) \cap CM(A.4) \neq \emptyset$, $CM(A.i) \subseteq CM(A); i = 1 \dots 4$, and $CM(A) = \bigcup_{i=1}^{4} CM_i$?

Example practical cases to consider might include:

1. at reorganization of Dutch police Rotterdam-Rijnmond ([13, case ROOD]), DEMO Construction Models were made for the 4 large departments, and afterwards combined and optimized – e.g., showing optimizing possibilities for using the Police Dog (K-9) service unit.
2. at a large shipyard, the collaboration and the priorities of collaboration partners became clear when discussing what-if scenarios, such as "what happens when new requirements for the ship come in, while already building the ship?"; this triggered collaboration between people from strategy, marketing, sales and engineering.
3. in a similar way, the robustness of collaboration and the correctness of its model was tested by discussing often occurring specific situations at the Air France KLM Cargo merger, e.g. "what to do if the actual size of the shipment doesn't match the size as mentioned during the order taking process" [19].

A preliminary thought about an answer for inter-entity consistency could be that it depends from the splitting criterion of the entities. Let's take the pizzeria-case as an example.

One extreme could be that the criterion is only "service region", which means that each entity fulfills exactly the same business (with the same value proposition, the same DEMO CM, the same semantics etc) in the regions South, Middle and Nord. In that case it could start with the implementation alternatives looking different, e.g. because pizza home delivery in the North of the Netherlands with its beautiful lakes in Fryslân may very well be done by boats or drones, while home delivery in the South of Limburg might need e-bikes or motorcycles – which could of course lead to different business cases per region, implementation roadmaps, etc. But may be also a discussion should take place whether it would be a good idea to enforce in each region the same Quality of Service, especially home delivery time, because it would be easier in the Middle than in the North & South.

Another case could be that the criterion is "functional specialization", in which one entity is fulfilling the completer role, one entity is doing the baking, and one entity is doing the home delivery. In that case there would a "minimal coupling" between the entities, also minimizing the risk of inter-entity inconsistencies.

And of course all types of mixtures of criteria could be applicable at the same time in the same organization, e.g. having a pizzeria with one Shared Service Centre for sales completion (including payment handling), and 20 local entities (one per city/region) in which both the baking and home delivery is performed for that area.

Q 3 *How to ensure intra-entity consistency, i.e. consistency within the ED for one entity for all its ED-elements (e.g. between Strategy, Product Definition and Enterprise collaboration - intention)?*

Clarification. The question is inspired by P2, P3 and P5 (and later A09). In a practical example one could ask "how do I know whether the proposition from the Business Model Canvas has to be changed, now the extra sub-transaction for home delivery in the pizzeria has been added?" To support this, the metamodel for ED should be made explicit (Q4), a governance model for the (if necessary: federated) ED process should be in place (Q5), and this should be supported by tooling. This could be done by elaborating topics and storylines in ED, set up in analogy with the business case storyline in subsection 2.2, ultimately covering all components in ED.

Q 4 *What is the metamodel of Enterprise Design?*

Clarification. The question is inspired by P3 and P5 (and later A06, A09). This is a key enabler for traceability and coherence of ED-elements, e.g. that the Enterprise collaboration – intention is elaborated for the intended product from Product Definition, and vice versa. Making the metamodel should with creating precise semantics for each ED-element, even when its originator (builder of the method) did not make that explicit, and then connect it with the semantics of other ED-elements. For example, the result should enable connecting the

value from the BMC's "value proposition" with Strategy via Strategic Fit, and the proposition of "value proposition" with the product kind from the DEMO Construction Model – in which case the question has to be answered "is value proposition from BMC [21] indeed a hybrid between proposition / product kind conform DEMO [4])", and "what notion of value is endorsed here" (e.g., from the e3Value-/Porter-/ValueStreamMapping-schools?" [10].

A first suggestion of the ED-metamodel focusing on the business case was given in "Coherence in Enterprise Design: some example relations" (slide 55 of the ED-workshop-presentation; see explanation in Ch 2.2), and this certainly needs formalization and expansion. This can also be connected to recent meta-models of Organization Implementation Variables [12,16] and other metamodels, such as from OMG's Business Motivation Model [14].

Q 5 *How does a governance model for (if necessary: federated) Enterprise De-sign look like?*

Clarification. The question is inspired by P5 and P6. To tune Enterprise Design programs and projects within and across entities and in different life-cycles of different products, differing in size, impact and development style, a governance model should be in place. Several frameworks and approaches already contain governance models, such as TOGAF [20], for agile and/or federated contexts SAFe [23], and for large-scale / diversified Digital Transformations [24]. The step here is find out to what extent these models are appropriate to guide ED.

Q 6 *How to handle triggers by interventions during ED?*

Clarification. Inspired by P6. With ED running, at any moment internal and external actors and factors could trigger changes as it happens/runs. The triggers can be caused by external and internal actors and factors. In principle, such a trigger can happen at any time. What would be adequate interventions for such triggers – e.g., go to start / continue & adapt on-the-fly / drop everything?

Now in principle ED is neutral about the origination of a trigger for change; ED does not prescribe order, but clarifies dependencies. It might be interesting to distinguish typical triggers for change, and try to determine for each kind of trigger the typical heat map in ED for that, e.g.

- change in human stakeholder field (human beings entering or leaving, the roles staying the same);
- change in stakeholder role field (roles (dis)appearing, including the human beings assigned to that role);
- change in competitive product;
- change in implementation technology (e.g. production technology such as self-steering drones, which might be able to transport the pizza order; or ICT technology, when database supplier X stops supporting version Y).

3.2   Team C: various (people, decision making, external validation)

Based upon the output from team C (Table 2), the following candidate research questions have been formulated.

Q 7 *How does ED relate to other approaches, such as handling innovation pipelines, the bimodal approach and architecting?*

Clarification. The question is inspired by V01, V02 and V10. Various other approaches exist, with different degrees of maturity and formalization, and it is useful to clarify where ED could fit in and/or be enriched by these approaches. Candidate approaches for this include:

- Innovation pipeline / funnel, being a steering instrument for innovation on the level of a portfolio (phasing: idea generation, concept testing, fledgling business, mature business; distinguishing level H1/H2/H3);
- bimodel approach, a "practice of managing two separate but coherent styles of work: one focused on predictability; the other on exploration" [8];
- Digital transformation;
- Capability management;
- architecture approaches, for instance on producing principles or software architectures.

Q 8 *Where and what iterations does ED facilitate?*

Clarification. The question is inspired by V02 and V04. At this moment ED (a) can be executed linear, and (b) has some 4 predefined iteration points (see subsection 2.1), and (c) the entry point can be middle-out (from product upwards), bottom-up (from issues in a current implementation) or top-down (from

Table 2. Output from team C: various

item	research questions
V01 How does ED relate to the notion of an innovation pipeline?	Q7
V02 How does ED relate to the notion of a bimodal approach?	Q7
V03 To what extent is ED "fail-fast"? Can you stop when things are no longer meaningful?	Q9
V04 what are the criteria for each step? iteration points?	Q8,9
V05 if ED is a toolkit, tools are missing; if ED is a Way of Thinking (WoT), theories are missing	
V06 who are the stakeholders? clarify this for every step, in a step by step explanation	Q9
V07 what is the scope for this process? what is the context?	Q8
V08 is there a need for separating product / service?	Q9
V09 are the tools suitable for the targeted stakeholders?	Q9
V10 where is the relation with the architecture?	Q7

strategic change). So it would be helpful to clarify where ED exactly / preferably is iterative, and how that can be applied in an organization that e.g. for 80% follows a waterfall approach. Expected results: clarified iteration points and typical iteration conditions for ED,

Q 9 *What are the exact results of ED, and why and for whom are they produced?*

Clarification. The question is inspired by V03, V04, V06, V08, V09 (and later A01, A02, A04, A05, A10 and A11). For each ED-element, it should be determined:

- what is its Definition of Done (DoD)?
- what question of which stakeholder is answered by it, and why is that relevant? comparable with the question framework for Rijkswaterstaat [22, Table 1];
- what are variations in level of detail, and why should which level be attained?
- what are recommended techniques to produce the result, and why?
- what it the recommended way of communicating the result versus doing the underlying analysis? Because many times the models needed to answer a certain stakeholder's question might differ from the preferred way of visualizing the answer for the stakeholder; indeed the stakeholder is interested in a certain type of informed governance, and from that should follow the methods & techniques to be chosen;

and over-all should be clarified:

- the terminology used (relationship with Q4), e.g. "what is exactly meant by product and/or service?".

The relevance of this that now can be chosen, for the type of question or problem in the enterprise which elaboration of ED-elements with what depth etc. could contribute to answering the question or solving the problem. For example, (a) problems in the area of effectiveness could probably be supported best by the ED-elements *Product Definition* in relation to *Strategy* and *Strategic Fit*, while (b) problems in the area of efficiency or reduction of operational complexity could probably benefit more by looking at different alternatives for *Enterprise implementation*.

3.3   Team B: approach

Based upon the output from team B (Table 3), the following candidate research questions have been formulated. The scale applied is as follows: three academics and one practitioner were voting; 10 points for each academic, 30 points for the practitioner.

Q 10 *What order of working should be chosen in ED, and what criteria should determine that?*

Table 3. Output from team B: approach

item	industry priority / relevance	academic priority / relevance	research questions
A01 What are the operational criteria for ED?	3?	2	Q9
A02 When to stop with an ED-element? What elements to include? (which type of results to elaborate? what criteria for choice of depth / detail / granularity within the chosen type of result?)	3?	2	Q9
A03 Methods / techniques as plugins to ED-elements (one could consider each element a kind of method and techniques; and different methods & techniques can be plugins to the elements that we have)	0	0	
A04 How to determine which ED-element to use (and with what techniques), e.g., depending on size and type of problem?	2	1	Q9
A05 How to align with stakeholders and their preferences in the choice of ED-elements and -techniques?	2	Q9	
A06 To ensure traceability: what is the tree of decisions (methods, best practices) between ED-elements, e.g., why did this Business Model Canvas lead to this DEMO Construction Model?	4	5	Q4
A07 What order of working to follow in EDF? e.g., top-down, bottom-up, bi-directionally, spiral-wise, or no prescribed order at all.	2	3	Q10
A08 Creative flow in ED differs from rationalization	4	4	
A09 Meta-models / matching ontologies between the ED- elements – the GLUE	4	6	Q3,4
A10 Viewing ED from the perspective of Situational Method Engineering (SME), ED looks like a configuration of plugins of techniques more than an approach. Differentiate between the goal (plug) and the instrument/technique used (plugin).	3	4	Q9,11
A11 Requirements between plugins and steps	2		Q9,11
A12 Specification of the projectability [2] of this "artifact"	4	3	Q11,12

Clarification. This question is inspired by A07. Several ED elements have dependencies, but that still leaves degrees of freedom in order of working. A fixed order sounds too rigid, and many approaches leave room for working top-down, bottom-up, bi-directionally, spiral-wise, etc. So the goal should be to make explicit criteria for choosing order of working in ED, given certain types of triggers

/ entry points, but also style of working (agile / waterfall), organizational cultural, federalization, etc.

Q 11 *What is the relationship between Enterprise Design and Situational Method Engineering?*

Clarification. This question is inspired by A10, A11 and A12. Using the perspective of Situational Method Engineering (SME) [11], it is important to distinguish between approach, plugs, plugins and configuration (a certain collection of chosen steps with methods and techniques in an approach). For example, if you take the Product Definition plug, or the Enterprise collaboration – intention plug, the fact that you have chosen the Business Model Canvas as plugin for the first has consequences for modeling the collaboration with the DEMO Construction Model as plugin and vice versa. The SME ideal is to let the approach take care of the "interfaces" between elements, on a sort of logical level (plugs), and not the configuration with its specific choice of techniques (plugins) – ensuring interoperability on a logical level, not on the technical level. So the expectations of the results should be specified on the level of the approach, not on the level of a configuration.

At this moment, ED already makes the distinction for each ED element in its goal and a certain instrument; e.g.,

- the ED-element with goal "Strategic fit" can use the instrument "goal tree";
- the ED-element with goal "product definition" can use the instrument "Business Model Canvas";
- the ED-element with goal "Collaboration network - intention" can use the instrument "DEMO Construction Model";
- the ED-element with goal "Collaboration network - semantics" can use the instruments "Business Object Model" and/or "DEMO Fact Model".

How exactly does this relate to the SME concepts of plug, plugin and approach? Is ED with its 11 elements an approach, each stated goal per ED-step a plug, and a possible instrument a plugin? And ED with "fixed" chosen instruments (e.g., achieve goal "semantics" by instrument "Business Object Model") a configuration? And where does the notion of "technique" fit in?

Q 12 *What types of cases is the ED approach able to cover (best), compared with other approaches? How to choose the best approach?*

Clarification. The ED approach is able to handle a certain types of cases; which ones? Other approaches could be also able to handle less, more or different cases in a better way. It will add value for stakeholders when they are supported in creating the best approach and (in SME terms) configuration for their situation, considering

- when choosing very general techniques and very few of them, it is a more generic solution, less specified but to more cases applicable;
- when choosing more or more specific techniques, the overall configuration becomes more scoped.

3.4   Takeaways

Based upon the (plenary postit-) answers on the question "What do you consider to be the key potential of Enterprise Design?" (Table 4), the following candidate research questions have been formulated.

Q 13 *Support ED by good tooling (based upon its metamodel - Q4)*

Clarification. The question is inspired by T12. To let Enterprise Design have value for continuous and sustainable transformation of an enterprise and/or a collaboration of enterprises, it should be supported by good tooling. Of course this has to be based upon a good metamodel (see Q4).

Q 14 *In empirical research, explore the causality of relations between the Enterprise Design approach and achieved benefits.*

Clarification. The question is inspired by T01-T04 and T06-T11. To further improve ED, it is important to study cases in which ED is applied, to find out the experienced benefits, and to try to establish a white-box connection between the ED: "what exactly caused this benefit, and why".

Table 4. What do you consider to be the key potential of Enterprise Design?

item	
T01	avoiding obvious mistakes by traceability
T02	large scale fundamental innovation!
T03	Doing more in the same time
T04	Seamless and coordinated "designer" and "engineer" work for strategy led transformation
T05	"Enterprise Design" as shown is a specific configuration to make design journeys, visiting key aspects / concerns along the way
T06	− holistic − checking strategic fit − adapting "quickly" to changes, because you are aware of the context and how strategy fits in it − analyzing product / service alternatives; see the "dotted lines" in the ED diabolo (Fig. 1)
T07	organizational transformation on the basis of strategic changes
T08	(solving) problems of IT-business alignment
T09	creating a set of shared representations which help multidisciplinary groups of stakeholders to jointly conceptualize the "enterprise"
T10	bring structure to the organization change process, while keeping the flexibility of elements – e.g., in choosing the instruments to use
T11	− governance, implementation, change − traceability, responsibility, transparency − disambiguation − value for society
T12	Well applicable now in an enterprise in workshops. To let this have value for continuous and sustainable transformation of an enterprise, it should be supported by good tooling, based upon a good metamodel (see Q4).

4   Conclusions and future research

The focus of this forum session on Enterprise Design was to establish a research program to further enhance, develop and mature Enterprise Design. We have found the following research questions, summarized and categorized in Table 5. The indicated industry and academic priorities (H=High, M=Medium, L=Low) have been derived as follows:

- the questions derived from the team A input (prioritized 1-6, with 1 = high priority and 6= low priority) have been assigned priorities as follows: 1,2 → H; 3,4 → M; 5,6 → L;
- the questions derived from the team B input (prioritized by votes, with 6 the highest and 0 the lowest amount) have been assigned priorities as follows: 5,6 → H; 3-4 → M; 0-2 → L;
- where one question appeared with more inputs in the same team, then the highest priority has been assigned;
- where priorities between team A and B differ, both have been mentioned, with the A-caused priority first, followed by a hyphen, followed by the B-caused priority;
- the priorities for Q7, Q8, Q13, Q14 are missing, since team C hadn't assigned priorities, and also no prioritizing was done on the takeaways;
- for Q1 and Q4 the authors have added their industry priority as H, because of the crucial role of time-to-market in industry.

Looking back at the harvest of research questions, especially from an industry perspective, one may ask: "To what extent is the final result of ED, namely a fast and yet robust approach to continuous transformation, now already achieved?" Because the maximum speed should be that choices at a more strategic and product level propagate within an attractive time-to-market – preferably as much as possible in an automated way [1] – towards an renewed and well-functioning enterprise, implemented with people and means, able to deliver its foreseen added value.

For industry, this gives a natural emphasis on the "constructional" part of Enterprise Design describing the future state, i.e. from the ED-elements *Enterprise collaboration - intention* until *Enterprise implementation*. Indeed, to achieve the future state, the bulk of work and money is invested here. And also the opportunities for formalization are more favorable in this area.

For the research agenda, we therefore recommend the following priorities from an industry perspective:

- expand the ED-metamodel, further formalizing the relationships between the ED-elements (Q3, Q4) with an emphasis on the "constructional" part of Enterprise Design, such as between the Enterprise collaboration - intention (DEMO models) and Organization Implementation Variables (OIVs) [16], and using recent work on System Implementation Variables [25];
- use low-code platforms for a fast validation of the found ED-metamodel and applying it to real-life cases – such as in an earlier prototype allowing different OIVs to be changed at run-time without recoding [12] (Q13);

– study empirical cases to establish best-practice timings (Q1) and iterations (Q8) of ED epics and sprints, levels of detail (Q9), orders of working (Q10), intervention-handling during ED (Q6), governance of single or federated ED streams (Q5, Q2) and finally the achieved benefits and how that has been brought about (Q14).

Table 5. Summary of research questions on Enterprise Design

item	industry priority / relevance	academic priority / relevance	category
Q1 What are reasonable durations / net times for all ED elements – and why?	L authors: H	L	process
Q2 How to ensure inter-entity consistency, i.e. consistency for ED-elements of the same type (e.g. the Strategy or the Product Definition) between different entities (such as departments)?	M	M	content
Q3 How to ensure intra-entity consistency, i.e. consistency within the ED for one entity for all its ED-elements (e.g. between Strategy, Product Definition and Enterprise collaboration - intention).	H-M	H	content
Q4 What is the metamodel of Enterprise Design?	H-M authors: H	H	content
Q5 How does a governance model for (if necessary: federated) Enterprise Design look like?	H	H	process
Q6 How to handle triggers by interventions during ED?	H	H	process
Q7 How does ED relate to other approaches, such as handling innovation pipelines, the bimodal approach and architecting?			validity
Q8 Where and what iterations does ED facilitate?			process
Q9 What are the exact results of ED, and why and for whom are they produced?	M	M	content
Q10 What order of working should be chosen in ED, and what criteria should determine that?	M	M	process
Q11 What is the relationship between Enterprise Design and Situational Method Engineering?	M	M	validity
Q12 What types of cases is the ED approach able to cover (best), compared with other approaches? How to choose the best approach?	M	M	validity
Q13 Support ED by good tooling (based upon its metamodel - Q4)			tooling
Q14 In empirical research, explore the causality of relations between the Enterprise Design approach and achieved benefits			validity

Acknowledgments

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