

The Nature of the EE Discipline

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Presented at: EEWC 2014
Vida Mar
Funchal
6 May 2014



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Introduction

- Enterprises originate when man and machine are organised to pursue some common goal [1].
- Both society and technology **increase in complexity**, so does the enterprise → increasingly problematic to understand, design or engineer the enterprise and ensure that its intended goals are met.
- Researchers and practitioners thus reported:
a need for a comprehensive view of the enterprise [3; 4; 5; 6; 7; 8].



Introduction

Enterprise Engineering

- Enterprise engineering (EE) emerged as a discipline to **design and align** the enterprise.
- The problem:
 - “The current **status** of enterprise engineering initiatives as taken by several universities, is **unclear**” [11, p 93].
 - A plethora of applicable literature and terminology exists, but with a **lack of shared meaning** [12].
- A key prerequisite for the EE discipline to progress is to **define a research agenda for EE**.
- **We aim to address two research questions:**
 1. **How could we set a research agenda for EE?**
 2. **How could an existing model (EECM) be useful in defining the *nature/domain of the EE discipline***





Introduction

Outline of this presentation

1. Provide **background** on:
 - Gregor's **four classes of questions**, useful when defining the bodies of knowledge or theories encompassed in a discipline.
 - Existing literature for defining a “**theoretical research agenda for the EE community**” → suggestion to extend the agenda to answer **four classes of questions**.
 - Constructional components of the Enterprise Evolution Contextualisation Model (EECM), which may address the **first class of questions (domain questions)** defined by Gregor.
2. Define the **nature/domain of the EE** discipline, using EECM. For each domain question, receive additional inputs for answering the domain questions.

RQ 1: How could we set a research agenda for EE?

- Ridley [16, p 12], based on Tardif [17], defines a **discipline** as a

“body of knowledge, definitions, and concepts built up over a long period and receiving consensus recognition by scholars; theories which interrelate the concepts and provide explanations of observed phenomena and permit predictions from them; and well established research methodologies”.

RQ 1: How could we set a research agenda for EE?

- In establishing any discipline, Gregor [13, p 611] (based on Godfrey-Smith [14]) states that

bodies of knowledge or theories need to exist to answer **question pertaining to four classes:**

1. Domain questions.
2. Structural or ontological questions.
3. Epistemological questions.
4. Socio-political questions.

Answering 2nd class of questions: structural & ontological

- Gregor argued that for the **discipline of Information Systems (IS)**, the **second class of question** received **limited treatment** in literature.



1. Domain questions.



2. **Structural or ontological questions.** “What is theory? How is this term understood in the discipline? Of what is theory composed? What forms do contributions to knowledge take? How is theory expressed? What types of claims or statements can be made? What types of questions are addressed?”



3. Epistemological questions.



4. Socio-political questions.

Answering 2nd class of questions: structural & ontological

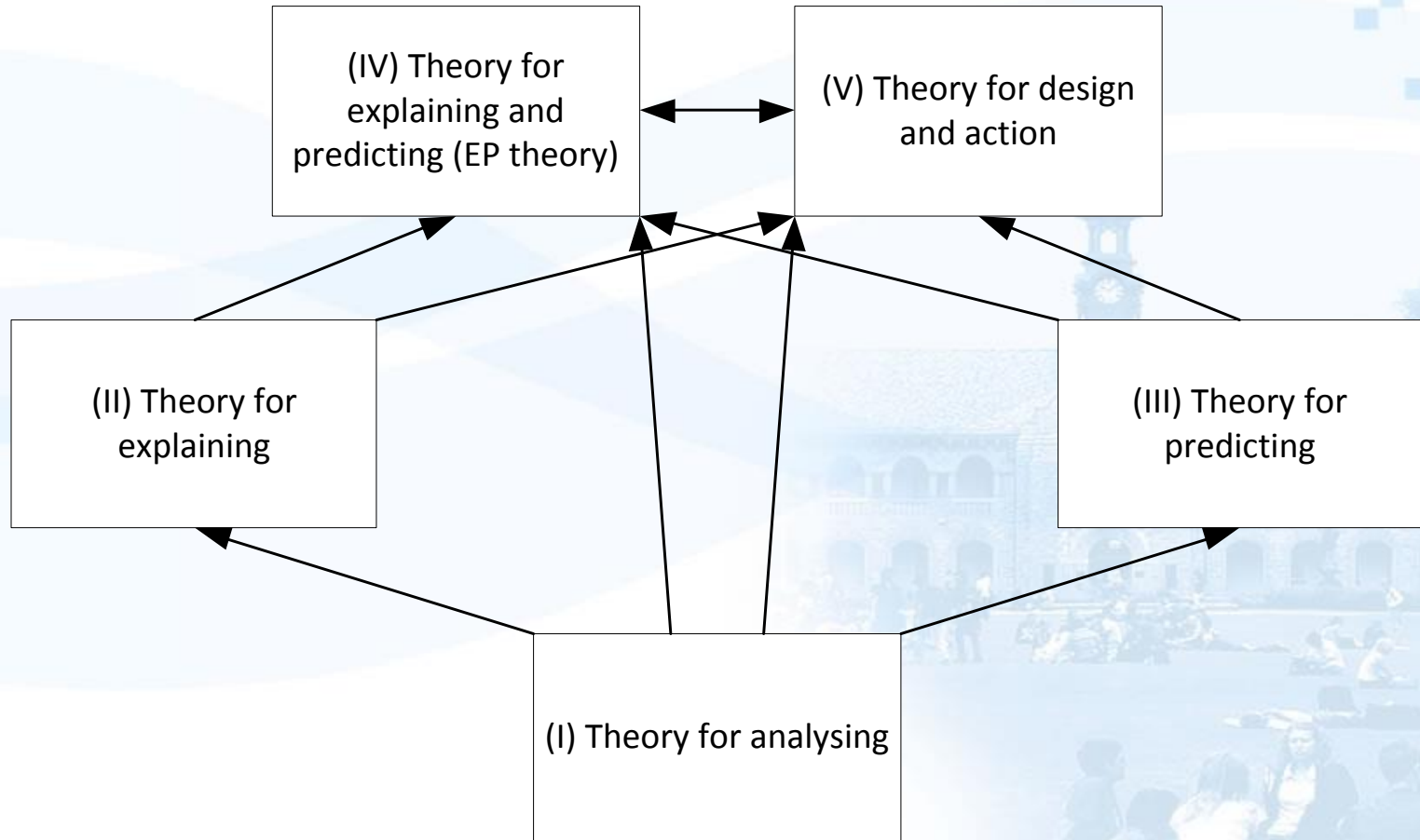
- Addressing the **second class of questions** for the **discipline of IS**

Gregor defines the *nature of theory in IS* via **5 theory types**, specifying distinguishing features for each theory type:

- I. **Analysis:** Says what is.
- II. **Explanation:** Says what is, how, why, when, and where.
- III. **Prediction:** Says what is and what will be.
- IV. **Explanation and prediction (EP):** Says what is, how, why, when, where, and what will be.
- V. **Design and action:** Says how to do something.

Answering 2nd class of questions: structural & ontological

- Gregor also graphically depicted the interrelationships among the **5 theory types for IS**:



Answering 2nd class of questions: structural & ontological

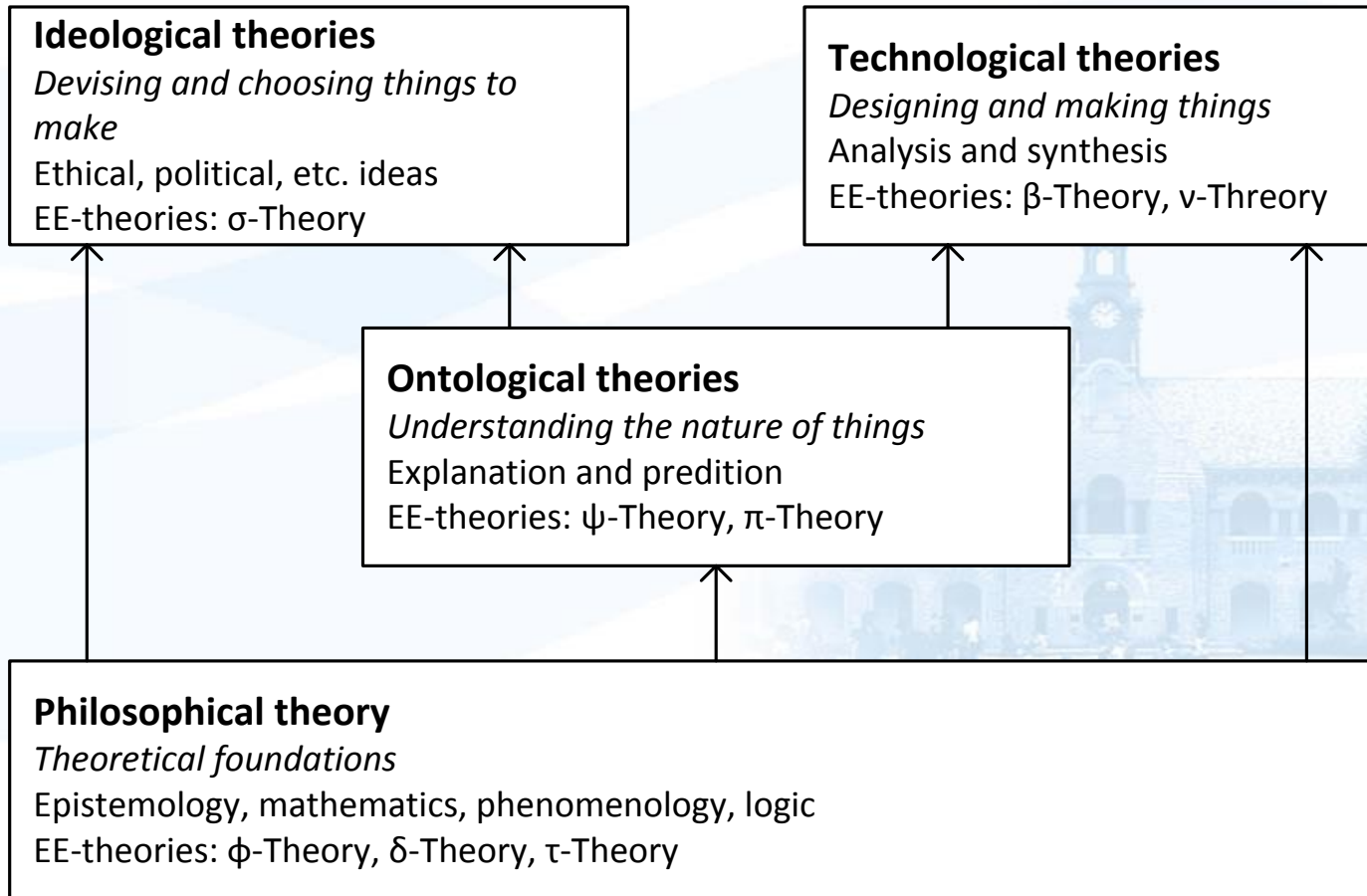
- Comparable to the **5 types of theory for IS**, Dietz et al. [11] present **4 classifications of related theories for EE**.

The classification categories are:

- I. **Philosophical theories** “address very basic *conceptual matters*” and include philosophical branches of epistemology & phenomenology, also logic and mathematics. Assessed in terms of their *truthfulness* within a specific area. Provide a *basis for understanding*.
- II. **Ontological theories** analyse phenomena to identify cause-and-effect and/or predictive relationships, and assessed in terms of their *soundness and appropriateness*.
- III. **Technological theories:** address means-end relations between phenomena (e.g. designing new ways of addressing existing problems), and assessed in terms of their *rigor and relevance*.
- IV. **Ideological theories:** address the goals that people may want to achieve in society and specifically within the enterprise, and assessed in terms of their *societal significance*.

Answering 2nd class of questions: structural & ontological

- Dietz et al. also graphically depicted the interrelationships among the **4 classifications of related theories for EE**:



Answering 2nd class of questions: structural & ontological

- Since the EE discipline encapsulates IS [1; 2] it is expected that the *4 classifications of theories for EE*, also encapsulate the *5 theory types for IS*.
- Comparing the distinguishing definitions that are provided for the different categories interpretive comparisons are possible.

<i>Classifications of theory for EE</i>	<i>Theory types for IS</i>
I. Philosophical theories	I. Theories for analysing
II. Ontological theories	II. Theories for explaining and III. Theories for predicting
III. Technological theories	IV. Theories for design and action
IV. Ideological theories	<No mapping>

- *4 classifications of theories for EE* is very useful in answering questions pertaining to the *nature of theory in EE*, already providing **theories** within this classification scheme.

RQ 1 : How could we set a research agenda for EE?

- *4 classifications of theories for EE* primarily focuses on answering the **second class of questions**.
- We propose that a research agenda for EE should start with the **first class of questions** that are required for establishing a new discipline, concerning the **domain** of the discipline:



1. Domain questions. “What phenomena are of interest in the discipline? What are the core problems or topics of interest? What are the boundaries of the discipline?”
2. Structural or ontological questions.
3. Epistemological questions.
4. Socio-political questions.

EECM: A model for answering the 1st class of questions?

- Previous research highlighted that fragmentation exists within EE discipline
→ the need to provide a **common reference model** to understand and compare existing knowledge within the EE discipline [18].
- The Enterprise Evolution Contextualisation Model (EECM) was developed inductively from existing enterprise design/alignment/governance approaches.
- EECM could be used to **contextualise/translate** an existing approach unambiguously when the approach presented a coherent and consistent *value-creation-paradigm* and a *consistent set of design domains* [15; 18; 19].
- We propose that EECM could also be used to define the **domain** of the EE discipline, i.e. answering the **1st class of questions**.

Constructional components of EECM

- EECM, a **descriptive model** that contextualises an existing enterprise design/alignment/governance approach, asks three main questions about a specific approach:

Question 1: ‘Why should the enterprise use the proposed approach to evolve?’

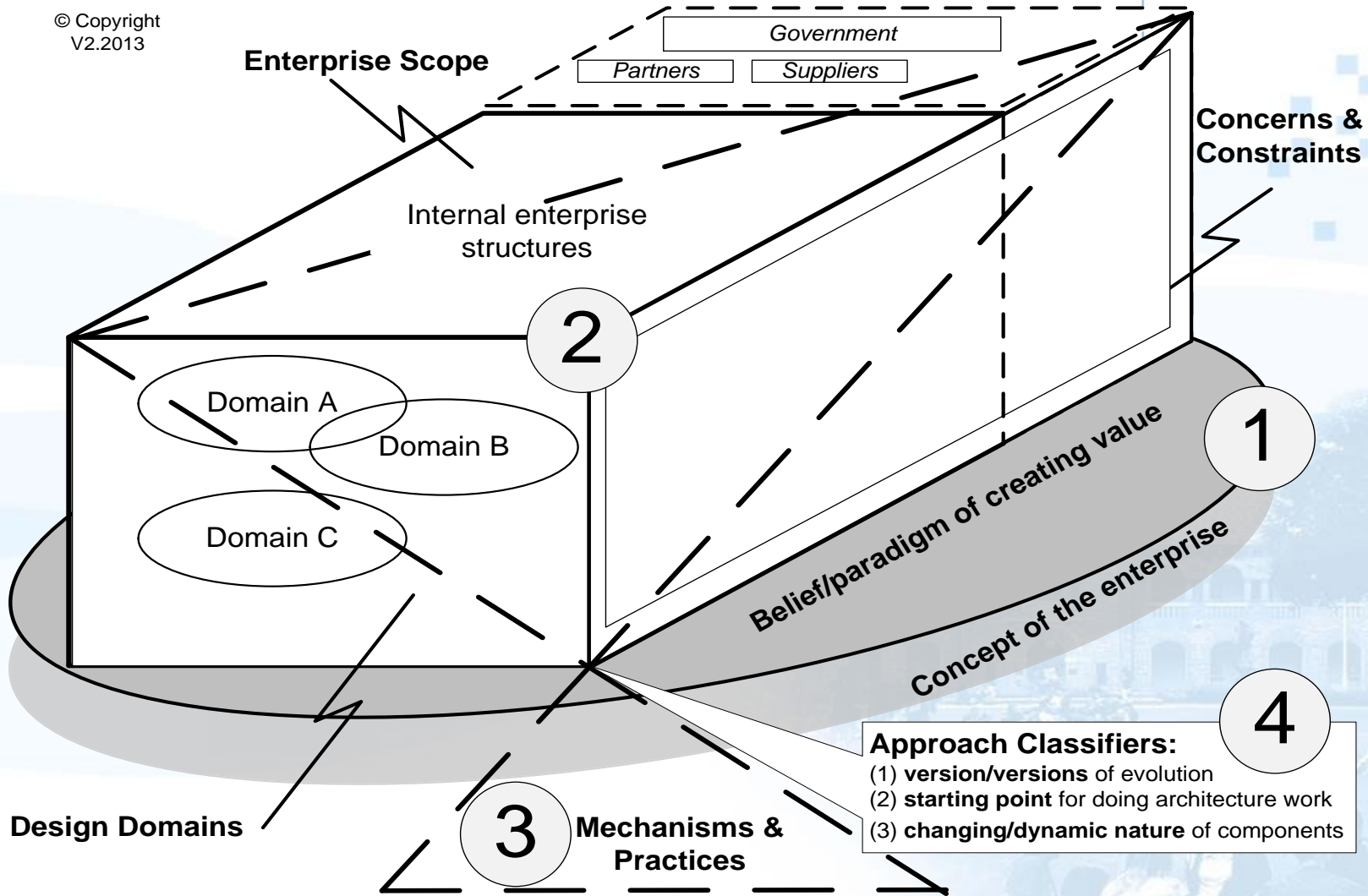
Question 2: ‘What should the enterprise evolve?’

Question 3: ‘How should the enterprise evolve?’

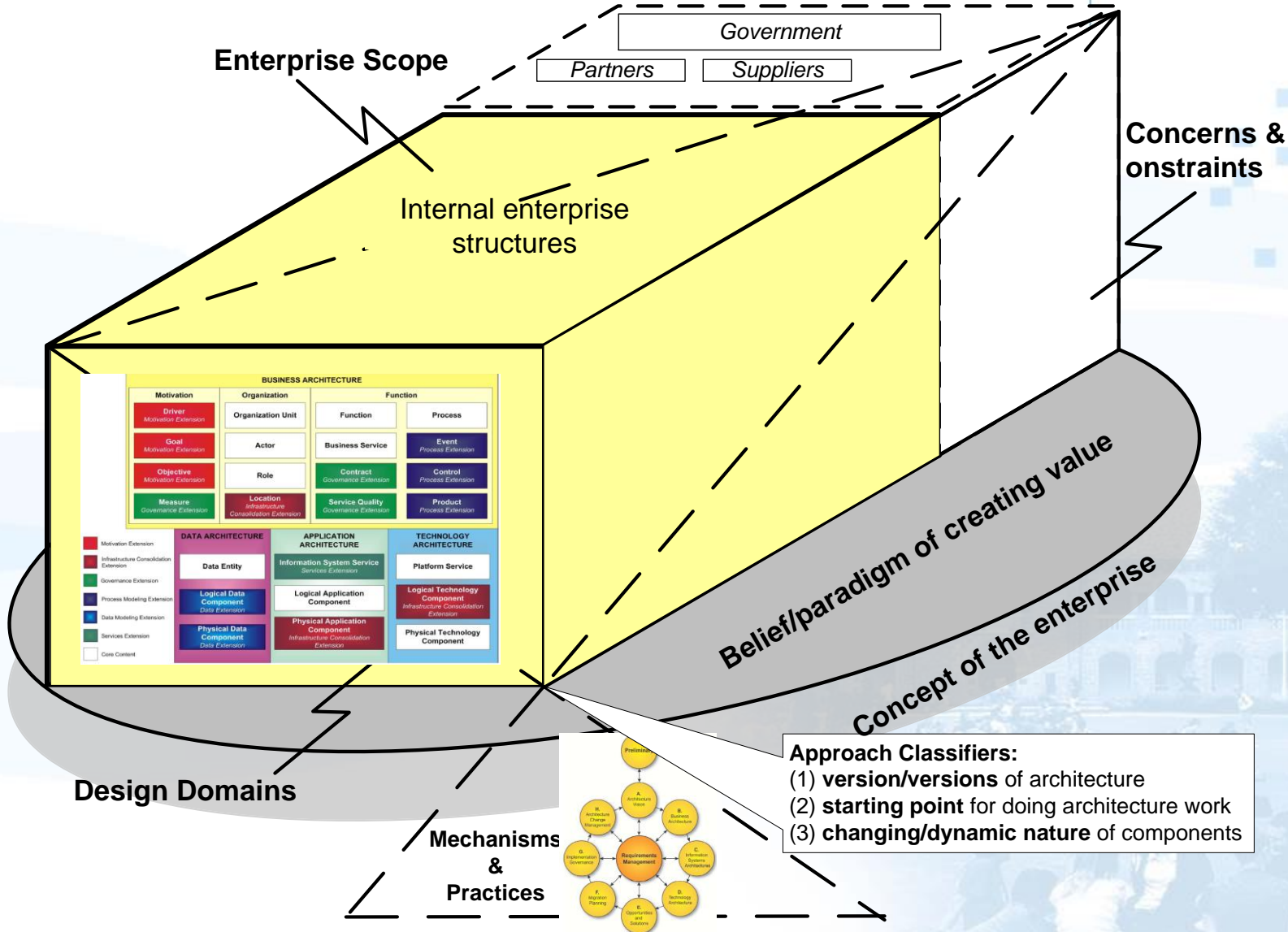
- EECM presents **4 components** for answering the 3 questions.

Constructional components of EECM

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Using EECM to contextualise TOGAF



RQ 2: How could EECM be useful in defining the nature/domain of the EE discipline

- We propose that a research agenda for EE should start with the **first class of questions** that are required for establishing a new discipline, concerning the **domain** of the discipline, which could be answered using the EECM.

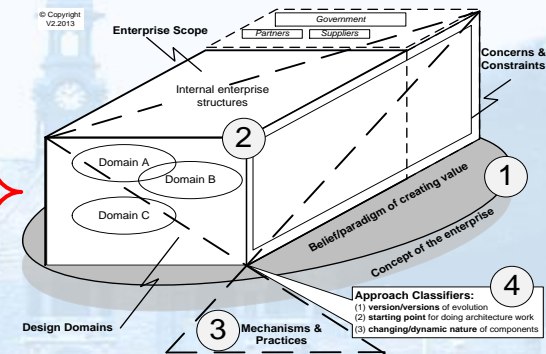
1. Domain questions.

- (1) What phenomena are of interest in the discipline?
- (2) What are the core problems or topics of interest?
- (3) What are the boundaries of the discipline?

2. Structural or ontological questions.

3. Epistemological questions.

4. Socio-political questions.



For discussion



- During the rest of my presentation, I would like provide opportunities for feedback and inputs regarding:
 - The **ability of EECM to answer** the 1st class of questions.
 - The comprehensiveness of the **1st class of questions** to define the **domain** of the EE discipline.
- We value your feedback and would like to know if there is any objection if we use your feedback/inputs as data.
- The hand-out includes the remainder of this presentation.

(1) What phenomena are of interest in the discipline?

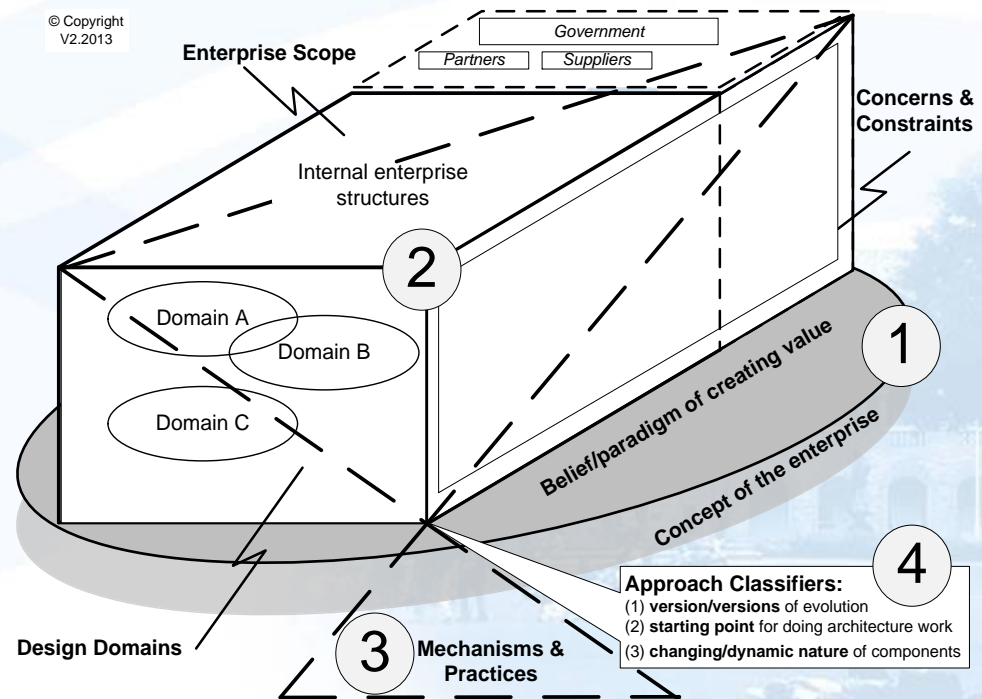
- The era we live in is characterised by rapid changes; the most conspicuous of these are **technological change**, including connectivity; smart devices and ubiquitous computing; and the generation of and access to a vast amount of information. The enterprise as a **socio-technical system** where society meets technology is in the **epicentre of technological change**.
- During the **development of EECM**, there was evidence that EE researchers addressed phenomena related to:
 - the **complexity** of the enterprise;
 - rapid **changing environments** impacting on the ability of the enterprise to adapt;
 - the enterprise as a **socio-technical system**;
 - access to information and **enterprise knowledge management**;
 - alignment of **technology/IT-infrastructure with business strategy**;
[1; 8; 36; 37; 38]
 - etc.

(1) What phenomena are of interest in the discipline?

- In our research we observed that there are **numerous approaches within EE**, but that fragmentation exists with regards to these approaches with a lack of a common terminology within EE → one of the key motivations for developing EECM.
- EECM was constructed through an inductive approach as a **meta-model** and high-level categorisation for all EE approaches at present [15].

(1) What phenomena are of interest in the discipline?

- The four components of EECM represent high-level categories of phenomena observed by approach protagonists:
 1. Concept of the enterprise & belief/paradigm of creating value
 2. Dimensions
 3. Mechanisms and practices
 4. Approach classifiers



(2) What are the core problems or topics of interest?

- One of the **problems** in the EE domain is that a **plethora of approaches and definitions exist**, as well as conflicting terminology
→ which EECM attempts to resolve.
- The three main questions of EECM that guide the contextualisation of an approach are considered as **meta topics of interest** within the EE discipline:
 - ‘Why should the enterprise use a proposed approach to evolve?’
 - ‘What should the enterprise evolve?’
 - ‘How should the enterprise evolve?’

(2) What are the core problems or topics of interest?

- When analysing and contextualising existing approaches, using EECM, several **more detail topics of interest** for the EE discipline were identified.

For example, a number of **value-creation paradigms** could be extracted from existing EE approaches, each focusing on a **different problem or topic of interest**. Examples from literature:

- Enterprises do not have an *aggregate view* of the enterprise to direct its evolution [21; 39; 40].
- There is a lack of *describing the enterprise components*, their interaction and interrelationships in a consistent way to ensure holistic solutions in terms of the solution components [26; 30; 40; 41; 42; 43].
- All enterprises face the need to continuously transform, *translating business vision and strategy into effective change* [9; 28; 30; 45; 46].
- Enterprises fail to implement strategic initiatives successfully, due to a lack of *IT governance* [26; 30; 34; 40; 42; 46] and *enterprise governance* [2; 11].
- Large enterprises experience that multiple decision-makers are involved during enterprise design, which requires *alignment of interests* [47] etc.

For discussion



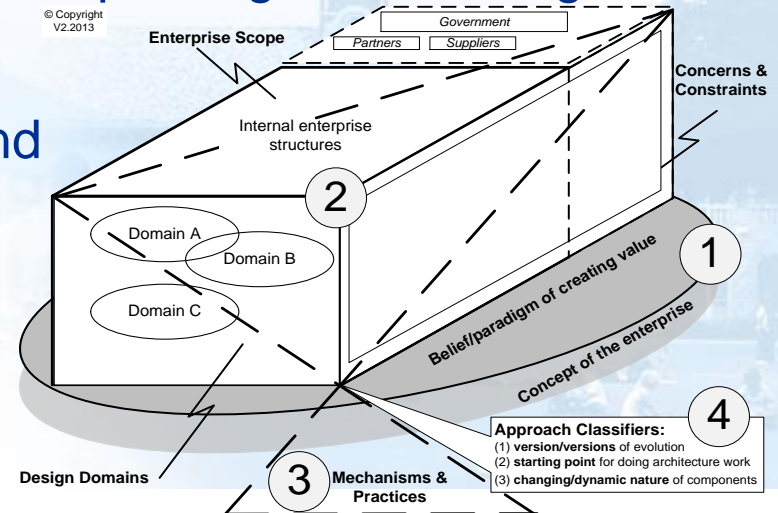
What **other** phenomena are of interest in the EE discipline?

What **additional** core problems or topics of interest should be addressed within EE?



(3) What are the boundaries of the discipline?

- Being a **non-prescriptive model**:
 - EECM highlights the commonalities within the existing body of EE knowledge.
 - EECM acknowledges different stances towards the design/alignment/governance of the enterprise.
- EECM as a meta-model thus represents the **boundaries of the current EE discipline** in terms of the:
 1. Concept of the enterprise & belief/paradigm of creating value;
 2. Dimensions;
 3. Mechanisms and practices; and
 4. Approach classifiers.



(3) What are the boundaries of the discipline?

1. Concept of the enterprise & belief/paradigm of creating value:

The *concept of the enterprise & paradigm of creating value* provides a **philosophical boundary** for the EE discipline, conceptualising about people and artefacts that work towards common enterprise goals.

i.e. approach authors use different *concepts and analogies* to define the enterprise. In addition, their *belief/paradigm of what could create value* in an enterprise directs and constrains the entire EE approach.



(3) What are the boundaries of the discipline?

2. Dimensions:

The three dimensions of EECM define a **design-scope boundary** for the EE discipline:

- Demarcation/delineation of **design domains** reveal “functional or constructional system facets for which design activities are required” [2, p 134].
- Domain experts apply their domain-specific knowledge in addressing the functional and non-functional **concerns** and existing **enterprise constraints** during the design process.
- The **enterprise scope** acknowledges existing organising structures within the enterprise system, which divides an enterprise into manageable parts, but also creates integration challenges for consistent evolution of the various organisational parts.

(3) What are the boundaries of the discipline?

3. Mechanisms and practices:

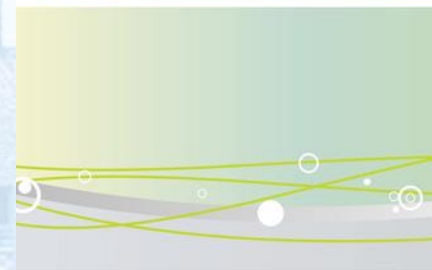
- The mechanisms and practices of EECM ensure that **practical facets** are included for the **design-scope boundary** of the EE discipline.
- Several categories of mechanisms and practices have emerged from literature as relevant and supporting mechanisms and practices in EE:
 - 1) Architecture description, reference models & modelling practices for design domains
 - 2) Selection and measurement of concerns
 - 3) Methodologies
 - 4) Governing principles
 - 5) Governing mechanisms, practices (frameworks) & standards
 - 6) Transformation roadmaps
 - 7) Analyses
 - 8) Maturity models
 - 9) Skills/learning requirements
 - 10) Software tools and/or guidance



(3) What are the boundaries of the discipline?

4. Approach classifiers:

- Three approach classifiers demarcate the EE discipline further to **distinguish different patterns** within existing EE approaches.
- Inductive research highlighted that an EE approach usually has a preference for:
 - (1) a specific version of evolution (current or future version of architecture description);
 - (2) starting point for doing architecture work (top-down vs. bottom-up); and
 - (3) a strategy to address the dynamic nature of enterprise components.



For discussion



What are the boundaries of the discipline?

- Does EECM demarcate the boundaries of the EE discipline as explained?
- In which other ways could the boundaries be defined?



Conclusion & future research

- We conclude that EECM could be useful as a mechanism for answering the **first class of questions** regarding the domain of the EE discipline, namely:
 - (1) What phenomena are of interest in the discipline?
 - (2) What are the core problems or topics of interest?
 - (3) What are the boundaries of the discipline?
- Supplemental research may be required to further demarcate the **domain** of the EE discipline.
- We also suggest further validation of the **four classes of questions** presented by Gregor and would welcome your participation and input.

Please

Please complete the participation list if we may contact you for further input

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