



19 Scenarios for Co-creation of the Future with Effectuation

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Summary

Effectuation is a theory originating in the literature of entrepreneurship, that focuses on behavioral attitudes of founders of multiple companies with over 15 years of experience and proven superior performance, so-called expert entrepreneurs. It includes a set of decision-making principles that these expert entrepreneurs apply in situations of uncertainty: start with resources in your control and set your goal later, commit in advance how much you are willing to spend and can afford to lose, form partnerships within your network and those who are committed, turn mistakes into positive learning outcomes and instead of predicting the future, co-create it. By stating these decision-making principles, it becomes clear that effectuation is diametrically opposed to the principles of causation that operate under a prediction-based logic, setting goals first and as a starting point, then looking for the necessary resources and then aiming to achieve these preset goals. Both the effectuation and causation approaches are part of havo and vwo Business Economics curricula and assessed in exams since 2020. Additionally, effectuation principles are closely aligned with trends in higher professional education to become more design-, experimentation- and implementation-oriented when doing final research papers, and with trends in business practice based on lean start-up principles. The increasing need for effectuation is driven by the fact that, with increasing uncertainty, future outcomes become more difficult to predict (Knightian uncertainty), human preferences are becoming increasingly more complex and volatile (goal ambiguity) and, due to ever increasing amounts of information accessible, it becomes more challenging to prioritize and determine what deserves attention in a decision-making environment (environmental isotropy). With that being said, the future adoption of effectuation in practice and education depends on two driving forces. The first driving force concerns the degree of uncertainty that organizations face, measured by the number and type of organizations that will face an environment where they cannot know the

consequences of their actions. The second driving force concerns the degree of goal ambiguity that entrepreneurs, managers and other organizational roles face, measured by the number of actors facing an inability to decide. Four future scenarios are identified, among which two extremes. One extreme is a scenario in which effectuation becomes the standard for disruptive startups (NICHE), in the other effectuation becomes a widely accepted, generic approach to management problems (OMNIPRESENCE). The future adoption of effectuation will affect universities of applied sciences by shaping education to become more design-oriented, requiring different professional attitudes from students and teaching staff, and by the construction of graduation programs that focus on the implementation of solutions and on the completion of the regulatory cycle.

Prelude

Rotterdam, 24 September 2033: “Today our university of applied sciences received confirmation that the EU Climate Change and Refugee fund will co-fund our ‘Sahel-Dutch internship program’. This reminded me of the fact that my role as manager of the Foreign Language Teachers Education department has completely changed over the last ten years. True, our program is still educating secondary school language teachers; that has not changed. But what really surprised me was our university’s response to the redundancy of educational facilities since the advent of blended learning initiated by the 2020–2023 Corona crisis. Where in the past redundancy would have our Board decide on abandoning facilities, the university now radically changed its efficiency policy and celebrated redundancy instead of eradicating it. This created a zero-cost investment opportunity for educational innovation. Apart from managing our education processes, this has changed my management role to becoming a part-time creator of new ventures. This culminated in an internship program where our students perform their internships online with secondary schools in the Sahel. Their supervisors are African secondary school teachers. Strange to think that only five years ago we were always short on internship positions. Today a substantial part of our internships is performed online with secondary schools in the Sahel. The first ideas for this innovation sprang from the minds of our Honors Program (HP) students. Each year they design educational innovations and they are required to experiment with these in real life in or outside our campus. We encourage them to design several alternatives and pick the ones that need the least investment to experiment with. Of course,

we went through several trials, adjusting and pivoting when needed. Initial contacts for the internship program were laid by international students and HP-students on an international study trip to Africa. From our university premises students perform educational activities with their foreign pupils enjoying our superb internet connectivity. The occupancy rate of our facilities has increased, but not to the level that we feel we have lost our flexibility. Today's news is rather overwhelming. I could never have imagined the political and societal implications of our initiative, until the European Commission pinpointed us as a frontrunner private initiative that fitted well with its new Climate Change and Refugee policy. We contribute to improving circumstances in refugee home countries, that suffer most from the climate change, by raising the educational level of its inhabitants and promote controlled migration to Europe. Albeit a small amount, the grant allows us to extend our experimental efforts; it offers us some money to play with. Currently we are experimenting with online exchange programs and joint degree programs with African universities. In former German colonies such as Cameroon and Namibia and French colonies such as Mauritania and Senegal, we scout candidates to teach in positions at Dutch secondary schools. These efforts compensate for the extreme shortage of German and French lecturers in The Netherlands, that we would have never been able to solve with Dutch students. Considering where we came from ten years ago, I don't feel that I am making any bets on the future; I am rather co-creating it. I cannot predict the future, but I am sure I will play a part in it, controlling the uncontrollable."

1. The Logics of Causation and Effectuation

To what degree will the future allow us to still act rationally? Or will we, not knowing the consequences of our actions or how we will feel about them, turn to designing the future ourselves? If so, we will become effectuators. To understand effectuation, we best start explaining first its inverse, causation, and two logics related to respectively causation and effectuation.

1.1 Causation

Causation is the act of aiming for an effect and then obtaining the necessary means to create it, being either existing resources or ones that need to be externally sourced. Causation assumes that the causality between these means and effects exists and is knowable. Causators see the world as a

puzzle: all of the pieces are there, they just need to be put in place (Chandler, Detienne, McKelvie & Mumford, 2011, p. 388). The concept is closely related to exploitation and phrases like refinement, choice, production, efficiency, selection, implementation and execution (March, 1991, p. 71). It is implied in concepts such as planning and prediction. Being a rational procedure of choice, it is grounded in rational theories of choice.

A rational theory of choice assumes choice between alternatives to be consequential and preference-based. Choice is consequential in the sense that the choice of alternatives depends on anticipations of the consequences of these alternatives. Choice is preference-based in the sense that these consequences are evaluated in terms of the decision maker's personal preferences (March, 1994, p. 2). A rational procedure of choice is one that follows a logic of consequence.

1.2 A Logic of Consequence

The logic of consequence that is followed in a rational procedure of choice consists of four questions:

1. What are the alternatives to choose between?
2. What are each alternative's consequences and likelihoods?
3. What is the value of these consequences to a decision maker?
4. What decision rule needs to be used to make a choice?

These four questions form a rational framework for the study of decision making and for explanation of behavior. When asked to explain their choices, most people rationalize, using questions from this logic of consequence to explain their behavior as a causal process (March, 1994, p. 3). When consequences are predictable, it makes sense to follow this logic of consequence (Sarvasvathy, 2008, p. 80). But what if they are not predictable?

The logic of consequence does not hold if preferences, consequences and their causality with alternatives are unknown. These imperfections to the standard rational framework require at least some modifications to the theory (March, 1994, p. 7). Instead, they could require the adoption of a completely different logic, the logic of design.

1.3 A Logic of Design

Play and reason are complementary instruments of intelligence (March, 1982). The intelligence that the logic of consequence applies is reason. It focuses on the desired consequences, and then reasons which resources are required to attain these. The intelligence that the logic of design applies is play. Its focus is on the available means, and the playful combination of these determines the eventual design.

Following a logic of design invites a different response to the four questions that represent the logic of consequence:

1. Alternatives are not given a priori but are the result of a design process based on trial and error.
2. Consequences are discovered, rather than predicted.
3. Values are not predetermined but shaped in the process (Slovic, 1995).
4. Decisions in designing are not rule based but identity based (Sarasvathy, 2008, p. 79).

1.4 Effectuation

Effectuation follows the logic of design. Effectuation is the act of using means that are available to create and discover consequences that are yet unknown. This design process is highly adaptive and allows for goals to be initially unclear, change and eventually manifest themselves in products, services, institutions and other human artifacts (Sarasvathy, 2008, p. xiii). Effectuators see the world as still in-the-making with a significant role for human action (Chandler et al., 2011, p. 388). The concept is closely related to exploration and terms such as search, variation, risk taking, experimentation, play, flexibility, discovery and innovation (March, 1991, p. 71). It is the approach that expert entrepreneurs adopt in new venture creation. The expert entrepreneurs in the study by Sarasvathy (2008) were founders of multiple companies with over 15 years of experience and proven superior performance (Dew, Read, Sarasvathy & Witbank, 2009).

Sarasvathy (2001) discovered that expert entrepreneurs apply five principles in venture creation that together constitute Effectuation Theory:

1. The Bird-in-Hand Principle: Initiate a new venture with your means. Means are someone's identity (who I am), knowledge (what I know) and networks (whom I know). Derivatives from these means are resources (what I have) and circumstances (where I am).
2. The Affordable Loss Principle: Determine your loss affordability. It is a psychological estimate of one's commitment to a new venture that balances one's current financial situation with the worst-case scenario, acting as a safeguard against excessive risk taking.
3. The Lemonade Principle: Leverage contingencies by embracing unpleasant surprises and remaining flexible in creating the new venture.
4. The Crazy Quilt Principle: Form partnerships with people and organizations willing to make real pre-commitments to the new venture. This expands the means available to the new venture.
5. The Pilot-in-the-Plane Principle: Focus on what is in your control and what does not need prediction (Sarasvathy, 2008; www.effectuation.org).

These principles have in an empirical study by Chandler, Detienne, Mckelvie and Mumford (2011) been translated into a validated scale for effectuation on the dimensions: 1) Flexibility, 2) Affordable Loss, 3) Experimentation and 4) Pre-commitments.

2. Effectuation: Relevance and Impact for Higher Education

2.1 Practical relevance of Effectuation

Our society celebrates the rational theory of choice. Evidence hereof can be found in the dominance of planning and prediction both privately and professionally. Recent advancements in Big Data and Artificial Intelligence all fit the model of causation and even further enhance our capacity to predict and plan the future.

Parallel to these advancements it is clearly noticeable that design makes incursions in our society. The popularity of Lean startup (Ries, 2011) and experimentation, such as AB-testing, all fit the model of effectuation. They improve our capacity to control and shape the future. The fact that most people will not recognize these as the traits of effectuation, does not make

them conceptually less a part of Effectuation Theory. With Artificial Intelligence and big data overtaking human cognitive abilities in prediction and planning, human actors consequently have a need to become more effective in design thinking and effectuation.

2.2 Impact of Effectuation

The impact of effectuation has so far been limited to new venture creation. The approach is taught in a growing number of business schools, promoting startups. The academic community has studied Business Angels and Corporate Entrepreneurs on their application of effectuation principles. It is, however, unclear whether effectuation is unique to entrepreneurship or whether its principles are applicable to other contexts and if so, which ones and how. If the principles of effectuation are applied by actors other than entrepreneurs and by organizations other than businesses, then its impact can be considerably higher.

2.3 Importance of Effectuation for Higher Education

Recent events have created a momentum for effectuation to become more important for Higher Education.

1. In the Netherlands Effectuation Theory is included in the havo and vwo curriculum. The new central exam for the subject management and organization tests effectuation at the levels 'Remember' and 'Understand' of Bloom's taxonomy (1956) for havo, and up to the level 'Evaluate' for vwo (College voor Toetsen en Examens, 2018; 2020).
2. Effectuation Theory is adopted by business schools as a practical approach to new venture creation with a solid foundation in academic research.
3. Entrepreneurship is embraced by the world of design. As the Arts need to become financially self-sustainable, entrepreneurship receives more attention in educational programs of Arts. A similar development is noticeable in Social work. The orientation of Effectuation Theory to design and the artifactual fits with a design-oriented audience.
4. In the Netherlands there is a trend in Higher Education to direct students to design-oriented research (Van Aken & Romme, 2009) and to require them to experiment and test, thereby completing the Implementation and Evaluation steps in the regulatory cycle (Andriessen, 2012).

3. Factors that influence Effectuation

The problem space of effectuation consists of problems of design. When the future is unpredictable, goals are unclear and the environment is driven by human action, effectual strategies and the logic of design become highly useful (Sarasvathy, 2008). Sarasvathy formulates three elements that together constitute the effectuation problem space:

- Knightian uncertainty, where it is impossible to calculate probabilities for future consequences (Knight, 1921). Under such circumstances a non-predictive logic is required, that does not take the event space for probabilities as given and immutable.
- Goal ambiguity, where preferences are neither given nor well ordered. Under such circumstances a non-teleological logic is required, that does not take preferences and goals as pre-existent or unchangeable.
- Environmental isotropy, where it is not clear what elements of the environment to pay attention to. Under such circumstances a non-adaptive logic is required, that does not take the environment as exogenous or as something to respond to and 'fit' with.

The three elements that influence effectuation are discussed in detail below.

3.1 Knightian Uncertainty

Uncertainty may exist in the context of decision options, preferences for options, relevance of criteria in evaluating options, data and information needed or the data itself (Awati, 2018). Uncertainty may furthermore occur on a physical level (statistics, information availability, access, reliability, etc.) as well as a metaphysical level (personal as well as subjective values and beliefs, social-economic and political environment, etc.) (Dew et al., 2009; Awati, 2018). The physical and metaphysical spaces require two quite different approaches, respectively causation and effectuation (Sarasvathy, 2008; Dew et al., 2009; Awati, 2018).

Knightian uncertainty (Knight, 1921) refers to high uncertainty that consists of a future that is not only unknown, but also unknowable, with unclassifiable consequences and a non-existent distribution of likelihoods (Sarasvathy, Dew, Velamuri & Venkataraman, 2003, p. 144). Knightian uncertainty is thus concerned with non-quantifiable risks, those risks whose probability distributions can only be established vaguely or not at all. An example of these

risks are the effects of a competitor's strategy or the effects of elimination of such competitors. For quantifiable risks, probability distributions can be determined by statistical analysis of a vast amount of raw data in order to determine the properties of potential downsides. Examples hereof are probability distributions for theft, fire or accidents.

Based on the above Knight (1921) distinguishes three types of uncertainty:

- Type 1: Uncertainty under which future outcomes are predictable and known ex-ante and where decision making is based on some form of systematic search or planning activity. Here the probability distribution is known but the number of draws is unknown.
- Type 2: Uncertainty consists of a future under which a given decision's outcome distribution is not known in advance but can be analyzed. Here the probability distribution and number of draws are both unknown.
- Type 3: Uncertainty also often called Knightian uncertainty or true uncertainty, where the future is unknown as well as unknowable. The future holds unclassifiable circumstances as well as a non-existing probability distribution (Wiltbank, Read, Dew & Sarasvathy, 2009, p. 119; Sarasvathy et al., 2003, p. 144).

Type 1 and 2 of Knight's typology are mostly engaged with systematic search and prediction and are thus dominated by causation, even though effectuation finds its use in type 2. Knightian uncertainty on the other hand is solely dominated by effectuation.

3.2 Goal Ambiguity

From the point of view of an effectuator, means are clear and often quite difficult to change. The effects that can be created with those means, in other words the goals, are to an effectuator ambiguous and flexible (Sarasvathy, 2008, p. 251). For expert entrepreneurs, these goals are not making profits, increasing sales or maximizing shareholder value. These can merely be regarded as constraints to the design problem (Sarasvathy, 2008, p. 80). Goals in the design context of effectuation refer instead to the characteristics of the business proposition. Goal setting is thus concerned with the operationalization of a concept into a product and a market. Goal ambiguity (March, 1978, p. 598) in the context of effectuation implies that a designer has no pre-existent preferences for particular product features and markets. It thus implies flexibility of product and market features in the

design process (Mauer, Wuebker, Schlüter & Brettel, 2018).

Goal ambiguity is a concept that is also applied in the context of causation, carrying the meaning of goal unclarity. In this context goal ambiguity is formulated as “the extent to which an organizational goal (..) allows leeway for interpretation” (Chun & Rainey, 2005, p. 531). This type of goal ambiguity is related to decision making and not design.

3.3 Environmental Isotropy

Environmental isotropy is the inability of an individual to determine ex ante which pieces of information in the environment are worth paying attention to and which not (Sarasvathy, 2008, p. 69; Fodor, 1983). Isotropy typically increases when the environment is driven by human action (Weick, 1979). Our current information age, in which data is omnipresent and fake-news spreads like a wildfire, is an environment that makes it more difficult for individuals to know what pieces of information to pay attention to.

3.4 Two Driving Forces for Effectuation

Sarasvathy (2008) identifies three elements that constitute the problem space of effectuation: uncertainty, goal ambiguity and environmental isotropy. In the academic discourse on rational theories of choice, choice depends on the dichotomy uncertainty (Knight, 1921) and ambiguity (March, 2020) (see table 1 for references).

Table 1 *Dichotomy in academic discourse*

Source	Uncertainty (Knight, 1921)	Ambiguity (March, 2020)
March (1978), March (1994)	A guess about uncertain future consequences	A guess about uncertain future preferences
Mumford (2018)	Things we do not know	What we cannot decide
March (1978, p. 589)	Theories of choice under uncertainty emphasize the complications of guessing future consequences	Theories of choice under conflict or ambiguity emphasize the complications of guessing future preferences
March (1994, p. 2)	Choice is consequential in the sense that the choice of alternatives depends on anticipations of the consequences of these alternatives	Choice is preference-based in the sense that these consequences are evaluated in terms of the decision maker's personal preferences

Uncertainty relates to things we do not know (Mumford, 2018). It implies a guess about future states of the world that follow one's choice. This is a guess about future consequences of current actions. It requires the act of imagining what will happen in the future as a result of these actions. When the future is truly unpredictable (Knight, 1921) then anticipating future consequences of present decisions is often subject to substantial error. Rational theories of choice under uncertainty emphasize these complications (March 1994, p. 3, §1.1.2; March, 1978). Environmental isotropy aggravates uncertainty. When it is unclear what to pay attention to, it becomes difficult to determine causal relationships and guess what the future consequences of current actions are. Sarasvathy's environmental isotropy thus amplifies uncertainty.

Ambiguity relates to what we cannot decide (Mumford, 2018). It implies a guess about how the decision maker will feel about the future reality once it is experienced. This is a guess about future preferences for the consequences of one's choice. It requires the decision maker to imagine how he/she shall evaluate what will happen. March (2020, p. 125; March, Olsen & Christensen, 1979) posits that future preferences, value premises or goals are to be constructed rather than discovered. They are thus not *ex ante* available for discovery but require construction, following a logic of design. The decision maker is unsure

of his/her own future preferences and faces confusion. Rational theories of choice under ambiguity emphasize these complications (March 1994, p. 3, §1.1.2; March, 1978). When it is unclear what to pay attention to, it becomes more difficult to guess what our future preferences are and to make decisions. Sarasvathy's environmental isotropy thus amplifies ambiguity.

In order to identify expected developments regarding effectuation we aim to therefore answer two sets of questions:

- To what degree are organizations facing uncertainty? To what degree are organizations facing an environment where they cannot know the consequences of their actions?
- To what degree are organizational roles facing ambiguity? To what degree are these actors facing ambiguity, the inability to decide?

4. Expected Developments regarding Effectuation

Given that uncertainty and ambiguity are the two driving forces for effectuation, an assessment is made to what degree organizations will be facing uncertainty, and roles within organizations will face ambiguity in the future.

4.1 Organizations facing Uncertainty

Uncertainty in an environment makes that organizations cannot know the consequences of their actions in the environment in which they are active. We therefore first investigate trends in uncertainty, whether our world it is becoming more volatile, uncertain, complex, and ambiguous and finally whether it is becoming more extreme.

4.1.1 Trends in Uncertainty

On a global scale uncertainty tends to be on the rise. Trends in uncertainty are measured using several approaches. These approaches are based on the volatility of key economic and financial variables (Ludvigson, Ma & Ng, 2019), indices based on text-searching in newspaper archives, such as the Economic and Policy Uncertainty index (EPU; Baker, Bloom & Davis, 2016), and recently the World Uncertainty Index (WUI), an index based on text-mining country reports of the Economist Intelligence Unit (Ahir, Bloom & Furceri, 2020). A limitation of these three aforementioned studies is that their datasets, that start in the 20th century, do not cover the first half of the century, which eliminates the uncertainty the world experienced in World War I (1914-1918), the Great Recession (1929-1939), and World War II (1940-1945).

Macro and financial datasets covering the period 1960-2015 emphasize recessions in 1973-1975, 1981-1982 and 2007-2009 and Black Monday (October 1987) but do not suggest a general rise in uncertainty (Ludvigson et al., 2019). Economic Policy Uncertainty, however, has increased markedly in the EU and the USA. This increase is not only driven by the economic forces of inflation and unemployment but also by the share of people having cable/wireless TV which in the USA is strongly associated with increasing political polarization (Duca & Saving, 2018). The WUI finds that global uncertainty in the period 1960-2020 has increased significantly since 2012. Increases in the WUI-index foreshadow significant declines in GDP (Ahir et al., 2020), an effect that future analyses of macroeconomic data should be able to corroborate for periods beyond 2012. Evaluating the period 1960-2020, these analyses suggest that

overall, uncertainty is recently on the rise, even though it was expected to return to 'normal' levels after the last major global external shock, namely the financial crisis of 2007-2009.

4.1.2 Trends in VUCA

VUCA stands for Volatility, Uncertainty, Complexity and Ambiguity. This acronym was introduced by strategic analysts in the sixties and gained much of its popularity through teaching materials of the USA army. Since 2014 the acronym has worldwide seen a steady increase in search popularity on Google (see figure 1).

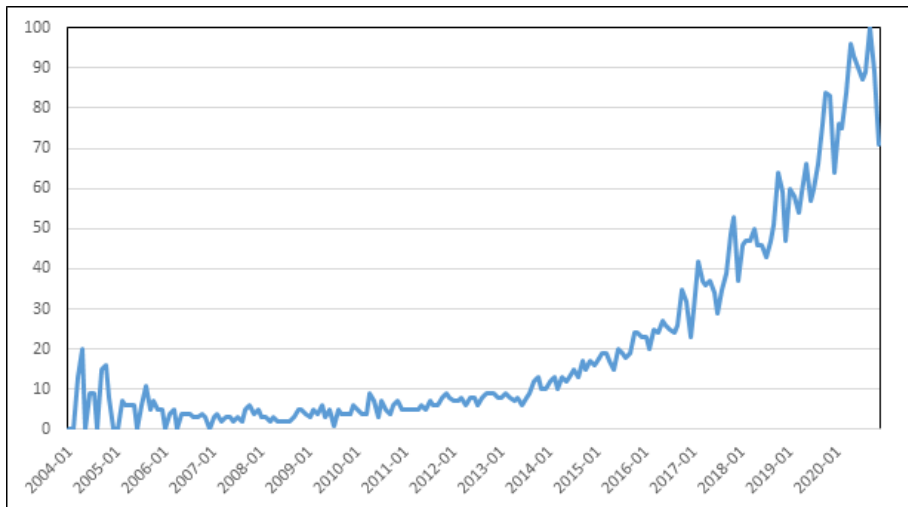


Figure 1 Worldwide search interest in the term 'VUCA' during the time period January 2004 until October 2020, relative to peak popularity indicated in the diagram by 100. A value of 50 indicates half of this peak popularity.

The individual components of VUCA are explained in table 2, together with an assessment by Bennett and Lemoine (2014b) of the degree to which results of one's actions can be predicted and how much can be known about the situation that is faced. The table also prescribes actions for response that the authors suggests.

Table 2 Definitions of VUCA-terms (in the order CUVA) together with their predictability, knowability and the distinct approaches for responding to them

VUCA	Predictability	Knowability	Approach for responding
Complexity: Many interconnected parts forming an elaborate network of information and procedures; often multiform and convoluted, but not necessarily involving change	High	Low	Restructure and employ experts
Uncertainty: A lack of knowledge as to whether an event will have meaningful ramifications; cause and effect are understood, but it is unknown if an event will create significant change	Low	High	Invest in information
Volatility: Relatively unstable change; information is available, and the situation is understandable, but change is frequent and sometimes unpredictable	High	High	Build in slack, spare resources for preparedness, and invest in flexibility/agility
Ambiguity: A lack of knowledge as to 'the basic rules of the game'; cause and effect are not understood and there is no precedent for making predictions as to what to expect	Low	Low	Experiment

(Source: Bennett & Lemoine, 2014a, 2014b)

The definition of ambiguity by Bennett and Lemoine (2014a) corresponds with Sarasvathy's definition of the term uncertainty. Two of effectuation's key components, flexibility and experimenting, are mentioned as approaches for responding to volatility and ambiguity. The VA-components of VUCA at the bottom of table 2 thus appear to have an association with effectuation.

Approaches to respond to complexity and uncertainty, in the definition of Bennett and Lemoine (2014a) in table 2, correspond with typical causation processes based on cause and effect relationships. Corroborating evidence for a negative association between complexity and effectuation is found in an empirical study by Mathiaszyk (2007), where effectuation is applied in projects where complexity, amongst others measured in scope, size, multi-cultural setting and type of technologies, is low. The CU-components of VUCA at the top of table 2 thus appear to have an association with causation.

Where Bennett and Lemoine (2014b) place VUCA in a matrix using the dimensions predictability and knowability, Mack and Khare (2016) organize its components in a model where changes in complexity are followed by changes in both volatility and uncertainty, together resulting in changes in ambiguity. This theoretical model suggests that the causation related CU-elements can influence the effectuation related VA-elements.

There is currently no clear answer to the question whether our environment is becoming a VUCA-world. Several business reports suggest a rise: "Arguably, leaders today face an extended period of rising VUCA" (Arkenberg, 2019). Others, however, hold a more nuanced view. Disruptive technologies such as the advent of Personal Computers (1981), the Internet (1983) and the GSM-network (1993) have recently changed our world into what Drucker refers to as the 'Next Society' (2002). These technologies are on the one hand disruptive but on the other hand they make the world less uncertain by improving our ability to predict (Kraaijenbrink, 2019).

4.1.3 Trends in Extreme Situations

The world will be facing more extreme situations in the future due to the inevitability of climate change. Since 1990 it is known that CO₂-exhaust is causing global warming. Policies that are required to limit the rising of global temperature to 1.5 degrees itself will have a tremendous impact on societies. Failure to execute these policies will have an even higher impact. It will change weather systems, make large parts of the earth uninhabitable, impact food supply and even threaten the mere existence of human life on earth. This implies that organizations active in environments that traditionally have been stable and predictable will see these change into dynamic and unpredictable ones. In the terminology of Taleb (2007) environments that once would be termed Mediocristan will become Extremistan, characterized by unpredictable events with catastrophic impact (Black Swans).

4.2 Organizational roles facing ambiguity

Ambiguity makes it hard for decision makers in organizations to make decisions. We therefore investigate to what degree ambiguity impacts a variety of organizational roles.

4.2.1 Trends in Entrepreneurship

The existing trend in society is that more people become entrepreneurs and create startups. An even stronger trend is the increase of self-employed personnel or independent entrepreneurs. Venture creation itself is a source of ambiguity; the entrepreneur cannot predict which venture will be successful. New self-employed entrepreneurs face even more ambiguity when they become an independent entrepreneur voluntarily; their choice for independence is based on preferences for something they have yet to experience. On a global scale, ambiguity is on the one hand reduced with nation-specific trends disappearing and globalization driving societies towards uniformity, predominantly brought about by travel, the internet and social networking (Pagel, 2014). On the other hand, ambiguity is increased for the individual by the diversity in offers available in a worldwide market that frequently can be even individually tailored.

4.2.2 Trends in Corporate Venturing and Intrapreneurship

Established companies have, apart from policies, procedures, and routines that sustain their efficiency and effectiveness, a need for innovation. The response by established companies to this need for innovation can take the form of new venture creation (corporate venturing) or by promoting employees to act and think like entrepreneurs (intrapreneurship). In order to grow, either in new business or practices, corporate venturers and intrapreneurs need flexibility to abandon unfruitful experiments, and investigate other possibilities (Chandler et al., 2011, p. 380). Companies can promote these types of innovative activities by allowing employees more autonomy and allowing them more time for bootlegging and experimental doodling on side projects (Pink, 2011).

4.2.3 Trends in Management

Future leadership will require more skills in managing uncertainty and ambiguity, such as preparedness, coalition-building, imagination, experiments and bravery. These skills are not efficient, but provide limitless capacity for adaptation, variation and invention (Heffernan, 2020; 2019). This type of leadership will reward innovation, continuous learning, autonomy and

customer-centric design thinking (Boerman, 2018). Economies require less worker skills for the efficient construction of products and delivery of services at scale, and increasingly depend on innovation, entrepreneurship, and other forms of creativity that rely on capabilities such as critical thinking, emotional intelligence, and collaboration. Worker and organizational resilience is then built by equipping workers with tools and strategies to adapt to a range of uncertain futures (Deloitte, 2020, pp. 73, 75). The shift from functional hierarchies to team-centric and network-based organizational models was seen as important or very important by 65 percent of the organizations in Deloitte’s 2019 Global Human Capital Trends report (p. 54). In these teams and networks, effectuators will be able to forge partnerships with people and organizations willing to make real pre-commitments to new ventures.

5. Four Scenarios

Based on the two driving forces for effectuation (section 3.4) and trends (section 4), four future scenarios for co-creation of the future with effectuation are developed (see figure 2).

number of actors faced with ambiguity in their organizations ("what we cannot decide")	many	NEW MANAGEMENT: effectual decision making in businesses	OMNIPRESENCE: effectual management of society
	few	NICHE: venture creation with effectuation	NEW VENTURES: effectual entrepreneurship embedded in society
		few	many
		number of organizations faced with uncertainty in their environment ("what we cannot know")	

Figure 2 Matrix with four scenarios for co-creation of the future through effectuation

5.1 The Axes of the Matrix

The two axes of the matrix are based on the two driving forces for effectuation (see section 3.4).

5.1.1 Uncertainty: the Horizontal Axis

Increase of Knightian uncertainty increases the application of effectuation in general. Uncertainty is typically the domain of entrepreneurship with businesses creating new ventures. In the NICHE and NEW MANAGEMENT scenarios, effectuation is typically applied by businesses. The number of other organizations that become involved in venturing and thus act as entrepreneurs in their environments of uncertainty is, however, on the rise (see section 4.2). In the NEW VENTURES and OMNIPRESENCE scenarios, there are many organizations that apply effectuation, not only businesses but also non-profit and (semi-)governmental bodies. In these scenarios non-profit organizations are less dependent on grants and subsidies, and experiment with venturing to become financially more self-sustainable. The same holds for (semi-)governmental bodies that stimulate public venturing and an entrepreneurial government.

The prelude at the start of this paper contained a narrative that corresponds with the OMNIPRESENCE scenario.

5.1.2 Ambiguity: the Vertical Axis

Increasing goal ambiguity promotes the application of effectuation to roles in organizations that traditionally applied causal principles only. If it becomes unclear for actors which pieces of information are worth paying attention to and what their future preferences are, this favors the application of effectuation in their roles. In the NICHE and NEW VENTURES scenarios there are few actors within organizations that apply effectuation, typically entrepreneurs, corporate venturers and intrapreneurs. In these scenarios, managers have clear goals and know what to pay attention to and therefore have less a need to act as entrepreneurs. In the NEW MANAGEMENT and OMNIPRESENCE scenarios there are many actors in organizations that apply effectuation in their role, managers in particular. In these scenarios their style of management has become more entrepreneurial, more effectual and less dependent on causation.

5.2 Description of Scenarios

The four scenarios in figure 2 are briefly described below.

Niche: Effectuation is only applied in its traditional domain: venture creation by businesses. Other organizations and managers rely on causation for their decision making.

New ventures: Effectuation is adopted by entities that traditionally are non-entrepreneurial but now engage in entrepreneurial activities. Its application is restricted to the creation of new activities. Other processes are still managed using causation principles.

New management: Effectuation is applied as an approach to decision making by managers in businesses. Managers depend less on causation processes in their decision making. They resort more often to experimental learning.

Omnipresence: Effectuation is adopted both in businesses and other organizations by actors in entrepreneurial and management roles. Organizations have built-in flexibility and carry out experiments frequently.

6. Possible Outcomes for Higher Education

The possible outcomes for higher education are discussed for the scenarios NICHE and OMNIPRESENCE, the two extreme scenarios in figure 2. In the NICHE scenario a minority of students require teaching and practice in effectuation, and in the OMNIPRESENCE all students will require this.

In the NICHE scenario effectuation is the standard approach for venture creation adopted by entrepreneurs, specifically for disruptive startups. Management and operational staff are not involved and keep on following the causation logic. In this scenario venturing is restricted to entrepreneurs, venturers and intrapreneurs within businesses. For most roles and organizations planning and prediction are key. Effectuation is in this scenario therefore taught only at business schools and in programs that require their graduates to become entrepreneurs. In their curricula effectuation is taught in courses specifically devoted to venture creation.

In the OMNIPRESENCE scenario effectuation is an accepted, generic approach to management and work, that assimilates existing causation approaches. Management and operational staff carry out experiments and integrate results of these in causal procedures. In management there is less focus on efficiency and more focus on agility. Information is collected by testing hypotheses using small test budgets only. Venturing is extended to non-profit and semi-governmental bodies, and effectuation logic is applied in these organizations when new activities are developed. Given the widespread societal adoption of effectuation, all students are taught to act as effectuators. Students in their first year directly adopt a design-oriented approach, develop a professional attitude that embraces experimenting and learning from mistakes, and follow a new thesis and research approach. These changes are discussed below.

6.1 More Design-oriented Education

In design-oriented education, students are required to create artifacts. There is less emphasis on learning about causal processes, which are general in their application, and there is more emphasis on experimental learning, which is very specific in its application. Students use the design thinking approach following the steps Empathize, Define, Ideate, Prototype, and Test (EDIPT; Plattner, Meinel & Leifer, 2012). There is more focus on innovation for businesses as well as social purposes, in particular for low-tech and low-cost solutions.

6.2 Facilitating a Different Professional Attitude of Students and Lecturers

Students will spend little time on their plans of action, and will be required to deliver quick results within a limited time span. This requires them to develop an attitude of acting, where more emphasis is put on their personal identity and on the use of their personal resources and network. Projects that they are involved in have a short cycle, and very much resemble startups with a high degree of interaction between education and practice. Teams are multidisciplinary and interdisciplinary, which requires students and lecturers to collaborate throughout the university, and expand their horizon and network. This requires a different attitude from lecturers and different types of assessment in educational programs, and it requires universities to extend their network and partnerships with businesses and society.

6.3 New Dissertations and Research Approach

Traditionally dissertations or theses follow a strong causation logic, taking causal steps, reasoning from beginning to end. This causation logic starts with a context analysis, that informs the formulation of the research question, which in turn directs the literature review, which then guides the methodology, which in turn determines how data is collected, and finishes with an analysis that answers the research question. A research design could alternatively follow an effectuation logic. Here, using a design thinking approach, students start by simultaneously asking questions and collecting data to understand the needs of people in their context. After a quick analysis a prototype is created, and feedback is solicited from the interviewee. Then several cycles of alteration occur. The contrast with the traditional approach in research is the speed of research cycle completion, the high number of research cycles, and the participatory approach in which problem definition and data collection take place at the same time. Research that follows an effectuation logic corresponds with action research with the active participation of practitioners (Mills, 2000). In evaluations of the dissertations there will be less emphasis on specific pre-defined learning outcomes and more on the creation of impact in practice. Students are assessed in their capacity as a team member and partner. Joint work is the rule and standalone individual projects are the exception. The focus in evaluation is on individual, personal growth and the identity of the student. There will be less emphasis on planning and reporting, and more emphasis on the final artifact that was designed and on the narrative in which the steps taken in the design process are discussed. Instead of a Go/No-Go approach that separates the planning and action phase, it is this narrative of the design process that informs the student how the next cycle needs to be improved.

7. Conclusion

The scenario planning approach adopted in this paper is a technique that adopts a causation logic. By identifying the driving forces of effectuation that will cause effectuation either to remain a niche method, a method that is omnipresent, or anything in between, we thus have applied a causation logic to effectuation. This appears to be a paradox, as effectuation is not about planning and prediction. There is, however, no contradiction. Causation is a valid approach to decisionmaking in certain circumstances, whereas application of effectuation is valid in other situations. Whatever scenario for

effectuation will eventually play itself out in the future, the power of effectuation remains. It is a proven method to co-create our future that will aid us when we face uncertainty and ambiguity.

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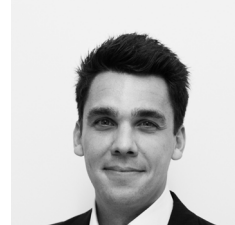
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