Identifying Functions and Characters for Science Fiction Prototyping

Abstract

The use of Science Fiction Prototypes (SFP) for policy, business and community organisation forecasting and planning is an increasingly popular approach. Examples of recent use of this technique can be found among individuals and organisations such as futurologists (Johnson), research communities (Creative Sciences, a British Academy of Management workshop in February 2013), government departments (The UK's Department of Transport) and science fiction writers (Sean Jones, Gary Graham and Geoff Nelder). Recent special calls for papers by journals such as *Futures* and *Technological Forecasting and Social Change* document the breadth and potential of current SFP applications. Current usage of this approach utilises science fiction - and speculative fiction - to elicit audience participation with the imagining and description of future possibilities around a specified topic or subject area. This technique is also being actively extended by its proponents to incorporate the use of video (Light, 2011). This paper examines the themes and perspectives utilised in science fiction and other forms of speculative writing to present an overview of available functions and character types to develop further usable prototypes. The analytical approach we adopt is inspired by Propp's formal analysis of repeating functions in Russian literature and Altshuller's systematic review of regular patterns found within Russian patent applications. Revealing the common functions, characters and inter-linkages found in science fiction writing provides a generalised applicability of SFP to business planning as well as providing clear examples of the forms and purpose of stories that can be drawn upon for SFP workshops.

Science Fiction Prototypes and Storytelling

Science Fiction Prototyping (SFP) utilises stories to facilitate innovation and problem solving. The advantage of SFP is located in the way that stories and storytelling are able to simultaneously embed the complex day-to-day interchange of multiple functions and characters while projecting a vision of a future - irrespective of whether it is utopic or dystopic. Furthermore, SFP as storytelling brings with it the ability to document the envisaged consequences of any number of specified circumstances including business, technological, environmental and ethical combinations. This form of meaningful 'packaging' and the use of common devices found in the science fiction genre offers three forms of opportunity for innovation and business development. In SFP business problems can become 'storified' and through this process of the gathering up of interrelated narrative, functions and characters a solution can be derived. In this form of SFP the problem becomes the story. SFP can also be used to represent and describe new products or concepts in an accessible manner that does not require specialist knowledge or skills. The prototype is the story and the story is purposely crafted to

offer this guidance. This perspective is the approach documented by Johnson (2011) and is the form of opportunity that is specifically labelled by him as SFP. Finally, works of science fiction can become the pivotal inspiration for business development and innovation. This may be a specific object employed by the characters or references made to specific practices or processes in a way that they are assumed to be commonplace knowledge within the storyworld. The story is the inspiration that unintentionally provides the solution with the right reading and reader. This last form is the most familiar form of SFP with science fiction regularly cited (Rutherford, 2010) as being the initial inspiration for the archetypical stroke of personal 'genius' that becomes the development of, for example, new communications technologies as well as other devices and products. Systematising the focus and potential use of these different types of SFP assists in identifying the 'next steps' required to make use of, and apply, SFP. Johnson acknowledges that "SF prototyping is not about predicting the future" and rather about a conversation between "scientists, colleagues and research partners" (Johnson 2011, 121). However, Johnson's explanations for how this conversation is translated between individuals within the conversation is in danger of being reduced to a single "Eureka" moment of shared insight (e.g. Johnson 2011, 117). While this initial moment of realisation is arguably an integral aspect of all innovation work, these moments are themselves only the harbingers to a more systematic analysis. This work endeavours to recognise the nature of this latter conversation and the processes of further 'translation' that necessarily occurs between different types of SFP before proceeding onwards to some form of conclusion or solution (Figure 1). What is described as 'deconstruction', 'invention' or 'implementation' in Figure 1 effectively expands upon and formalises the more amorphous "Eureka" moment within Johnson's discussion.

By focusing on the analytical aspects of SFP and its specific use for business problem-solving and prototyping we direct attention to taking the story onward from being a work of inspired fiction to the development of innovation and its embedding with an organisational vision. Johnson (2011) already documents one part of this process in developing the 'prototype as story' from a narrative sequence or external inspiration. However, this acknowledgement is only one part of a single possible route from story to business innovation and vision. For this innovation work to be achieved, a significant aspect of the analysis involves deconstructing stories in a way that offers meaningful interpretation, translation and potentially inversion from problem or inspiration. It is a significant observation that the prototype in whatever form of story it is presented effectively tests the visionary direction of an organisation and its potential fit with current operations and strategy (Bell et al, 2013). This testing activity is in no small part achieved by the degree of regularising and formalisation that an organisation might require to move from story to adoption and institutional embedding. Few organisations would be comfortable with working directly or solely from a science fiction story as the key tenet of their long range planning or new product development. For most organisations some level of deconstruction is necessary to systematise and formulate the proposed direction. The process of deconstruction also offers opportunities for individuals to develop a shared and agreed organisational vision. The thinking and approaches that Science Fiction Prototyping encourages forces the organisational

agenda beyond direct operational considerations by responding to the need to innovate and emphasising the importance of effective strategic and visionary management. The SFP constructs a story that presents potentially viable forms of organisational vision that are tested through the subsequent action of their deconstruction.
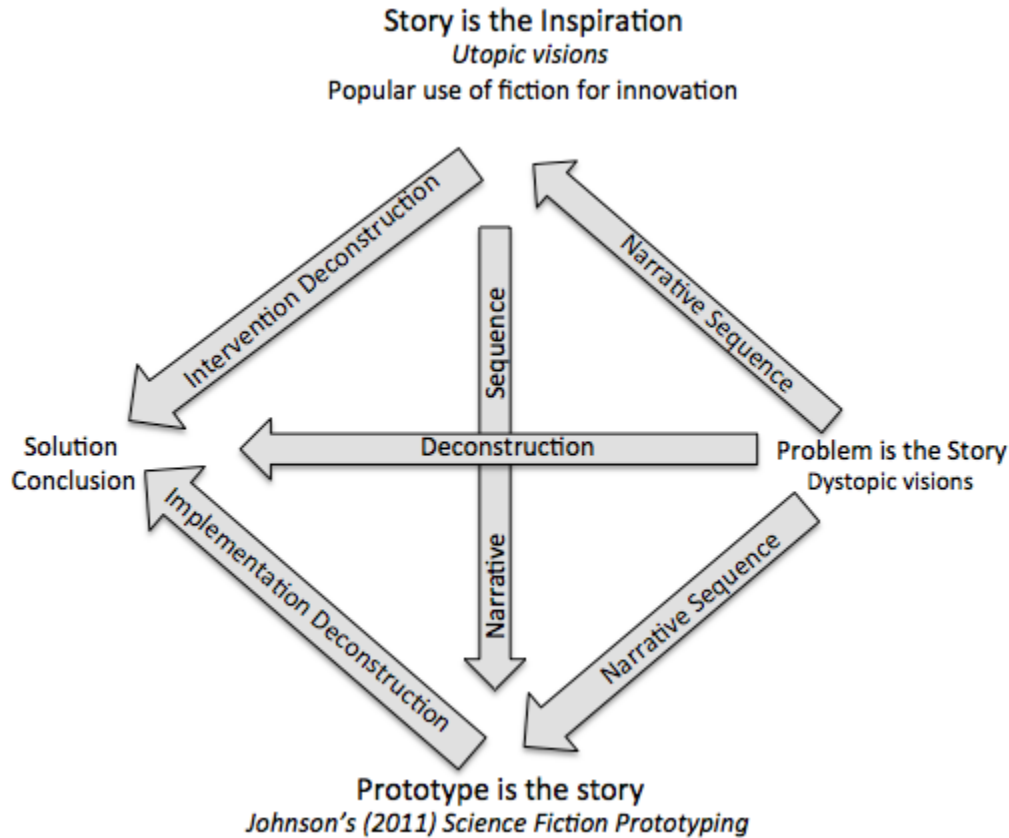
Story is the Inspiration
Utopic visions
Popular use of fiction for innovation

Intervention Deconstruction

Narrative Sequence

Sequence

Deconstruction

Solution
Conclusion

Problem is the Story
Dystopic visions

Implementation Deconstruction

Narrative

Narrative Sequence

Prototype is the story
Johnson's (2011) Science Fiction Prototyping

Figure 1: Relationships of story types in SFP towards a solution

Storytelling and Stories

Stories have been regularly used in a variety of management contexts including, for example, team working (Housley 2003), employee commitment (Collison and Mackenzie 1999) and interview work (Cortazzi 1993; Coffey and Atkinson 1996). Companies such as Marks and Spencer and the BBC have reportedly appointed in-house poets and the late Anita Roddick championed the use of storytelling as a 'humanised communication' employing six full-time professional storytellers in The Body Shop (Collision and Mackenzie 1999). More broadly Anthropology uses the stories of informants to discern cultural insights and to facilitate understanding of individuals' shared experiences (Preston 1978; Toelken 1975). Within a culture and among its members, stories (Housley 2003) serve the function of helping to maintain and reproduce normative and cultural organisational structures. Stories themselves can be understood in terms of both narrative structure, in the ways that they have a beginning, middle and end, as

well as their social function when stories are deployed with the purpose of achieving a goal (Coffey and Atkinson 1996, 54). It is primarily within this latter purpose that this paper focuses. Coffey and Atkinson (1996, 76) consider stories as, "a mode of communication, a way of speaking, the essence of which resides in the assumption of responsibility to an audience for a display of communicative skills, highlighting the way in which communication is carried out, above and beyond its referential content." Coffey and Atkinson (1996) appreciate the situated character of a story's production in their use of a conversation analysis perspective, however, this emphasis has a tendency to overlook issues of characterisation and intent.

Conversation analysis also explores the significance of story form and length (Sachs et al 1974). For Sachs a story is either long or short because of its relationship to the managed intent of the conversationalist. Within conversation the speaker is likely to 'self select' and design a story for the intended listener. The story is necessarily composed of a narrative structure that includes *preface*, *proper,* and *closings* and its length plays an important role in the makeup and conveyance of meaning and intent within conversation. Schenkein also argues that structure is important in order for listeners to make the story recognisable and interesting (Schenkein 1978, 219). Stories in this way are both sequentially and categorically organised (Watson, 1997). This observation is the mechanism that enables this paper's exploration of science fiction stories as a mechanism for identifying, developing and potentially deploying a business goal (Coffey and Atkinson 1996, 54) while also initiating forms of self-reflexivity and a way for the input of creative thinking to be systematically introduced within business practice. Collison and Mackenzie (1999) argue that through storytelling the imagined images that are called up are the means of embedding new ideas or ideas that challenge the *status quo*; 'Through the expression of our experience, we share our fears and hopes, and create vivid imaginations of the future.' (1999, 38).

SFP presents a form of storytelling that is developed and employed for a conscious and specific purpose. This is not, however, a distinction from previous forms of storytelling referred to by studies of anthropology, literature or narrative. The continuity that SFP shares with previous forms of storytelling is the basis of its ability to employ earlier stories, that pre-date the documenting and recognition of SFP, as a prototype. The difference from previous practices of storytelling that is brought by SFP is the active, engaged and conscious use of stories post-creation with a defined purpose directed towards innovating.

Using SFP Stories

Science Fiction Prototyping embeds new developments, inventions, products or services into a context defined by a story that enables sharing and communication of these ideas. We draw upon recognised systematic and formulaic narrative structures (e.g. fairytales) in a manner inspired by Propp's analysis (1958) of Russian folk tales. SFP extends this relationship further by inviting the reader to co-create by building upon and interpreting the original narrative. Barthes' (1974)

theory of the "readerly" and "writerly" text illustrates how a story or text can either make no demands on a reader as a readerly text, "like a cupboard where meanings are shelved, stacked, [and] safeguarded" or it can place great demands on the reader to co-create meaning as a writerly text, "...to make the reader no longer a consumer but a producer of the text" (Culler, 1983). A writerly text that is not overly reliant on shared understandings, signs and codes, encourages active interpretations and inspires creative thinking. The reader becomes an active creator in deriving meaning from the text. Within SFP this exhortation to create from the text is directed and expressed in a focused manner with the goal of creating business artefacts. The intention is to enliven the story by employing specific combinations of narrative, functions and characters which can bring out a prospective solution for a problem and viable business innovations.

While contemporary work practices and business processes tends toward overloading workers and consuming their time in operational 'firefighting' activities, solutions to business problems and the opportunity of new product developments often need to be fast, quickly understood and implemented promptly in order to gain advantage. Falling back to the use of Barthes' "readerly" texts represented in commonly understood tried and tested solutions leaves few avenues to activate otherwise unconsidered alternatives. The use of the readerly text echoes the use of business models to describe operational activities (Bell et al, 2013). Texts of this type do not present opportunities for invention or reflection. In the operational business environment innovation activities have a tendency to become reduced to a broadly mimetic function - drawing upon the observed work of competitors or importing new ideas from other sectors. Given space to reflect, evaluate and socialise the same workers are capable of challenging established assumptions, actively creating plurality of meaning and reaching innovative solutions. The significance of worker's labour and their inspirations are a latent potential embedded in all organisations that is frequently recognised in knowledge management literature (Swan et al, 1999). SFP is an approach capable of facilitating broad innovation in this manner. It can also be utilised to extend the understanding and use of established models of, for example, the team role types described by Belbin (1981, 1988) where science- and speculative fiction prototypes can shape decisions made around the composition of project teams.

Deconstructing SFPs

We approach SFPs with the acknowledged need to translate the creative work of the science fiction story into a systematic reading that necessarily involves deconstructing the narrative complexity into constituent components. The techniques of deconstructing and comparative analysis is well established and tested. Among these efforts is the work of Propp (1928) who developed a formalist approach to the analysis of Russian fairytales by identifying consistent series of seven character types and thirty one repeating functions (see Table 2). More broadly two distinct approaches to the interpretation of a story and its structure; the syntagmatic (or diachronic) and paradigmatic (or synchronic). The syntagmatic approach follows a chronological or linear sequence in which the combination of narrative choices and functions are interpreted to

produce an overall understanding. The paradigmatic approach considers the story elements out of chronological sequence and grouped around common shared patterns or themes. The two approaches are not mutually exclusive with the paradigmatic choices that are revealed becoming significant for the syntagmatic understanding of the story and the syntagmatic sequencing contributes to the identification of individual paradigms that have been employed within the story in a recursive process. Prototyping of new products and services or solving simple and complex problems within organisations can benefit from this intertwined combination of syntagmatic and paradigmatic approaches of a SFP.

Character	Team Role(s)	Explanation
Spock	Monitor Evaluator	Logical and impartial.
Captain Kirk	Resource Investigator Plant	A pioneer. Outgoing and unorthodox.
Captain Pike	Coordinator	Mature, calm and confident. Encourages Kirk to reach his potential
Uhura	Specialist Teamworker	Provides knowledge in rare supply. Co-operative and diplomatic.
Bones (Dr. McCoy)	Implementer	Disciplined and set in his ways.
Sulu	Shaper Resource Investigator	Action-oriented. Extroverted and communicative.
Chekov	Specialist Resource Investigator	Math-whiz. Enthusiastic and impulsive.
Nero	Shaper	Aggressive, challenging, thrives under pressure.
Scott ("Scotty" the Engineer)	Specialist	Knowledgeable, self-starting, and dedicated.

Table 1: Belbin's characters types and their relationship to Science Fiction (Star Trek) - www.improvingteams.com/blog/beam-me-up-belbin-star-trek-team-roles/

Belbin's (1981, 1988) research into team behaviour and management of teams concluded that there were nine types of behaviour or team roles (Table 1). Using the "Star Trek" universe each of these types were mapped to a specific identifiable character enabling higher levels of general recognition. Understanding team behaviour or resolution of a problem in organisations (where employees take on the role of a social actor) through the lens of fictional narrative has enabled analysis and understanding of the task (or quest) in focus and how the team could best approach

it. With this approach Belbin is refining the general claim that the main Star Trek characters of the original series represent a Freudian trio or a semiotic trinary relationship with a constant interplay of mutual interdependence. This is also an aspect of the approach taken up later by Marinaccio (1995) in "All I really need to know I learned from watching Star Trek". The nine roles of Belbin are recognised within management development activities to identify behavioural strengths and weaknesses in the workplace as a means of building cohesive and effective teams. Belbin's theory presents a set of character constructs or ideal types to achieve the team goal or quest. Antecedent approaches such as those of Belbin and Propp and the works they have subsequently influenced reinforces the current claims of SFP to utilise stories with recognisable character constructs and established narrative functions to facilitate understanding of innovative ideas and solutions.

Bringing a systematic process of deconstruction to SFP can itself draw productively upon the work of Propp and Belbin. Table 2 identifies the parallels and relationships between characters identified in Propp's analysis and Belbin's behavioural team types as well as general characterisations identified in literature. The table illustrates the connection between character constructs in literature and behavioural "types" that are adopted or simply found within organisational teams. The final column of the table extends these earlier works and proposes a derived series of SFP character types. The purpose of this identification is presented as a consistent mechanism for the deconstruction of science fiction stories as potential prototypes. Table 2 offers a prospective method for reading fiction as a SFP - 'reading' characters from left to right across the table assists in the deconstruction of a literary character into a participant in a business innovation. This mechanism can also be applied retrospectively to fiction that was not written with the express intention of being deconstructed. By identifying characters in terms of their relationship to potential innovation expressed through a prototype helps to understand the interrelationship of roles that can bring about innovation. This process of deconstruction also requires the simultaneous use of the narrative functions identified in Table 3. The direct intention of this pair of tables is to deconstruct science fiction rather than to 'build' a science fiction prototype. The relationship of SFP and deconstruction (Figure 1) highlights the importance of observation and inspiration as contributory sources for the creation of a prototype. Utilising Tables 2 and 3 as the inspiration for a SFP removes the elements of creativity that enrich a prototype and would hold to potential to create a type of recursive Hawthorn effect with output becoming the narrative inspiration.

Propp's Characters	Characterisation in Literature	Belbin's Types	Potential SFP Character Types
The donor gives something to the hero to support their quest		Plant. Creative, imaginative, unorthodox. keeps distance from team but always returns to share ideas.	The Inspirer - a (potentially distant) source for amorphous or unformed ideas, thoughts and actions

The (magical) helper supports the hero without initiating activity	Stock - Characters who are recognisable because of their regular appearance in fiction	Implementer. Pragmatic. devizes systems and processes to achieve the goal but lacks enthusiasm for radical ideals. Has an ability to turn visions into workable solutions	The Assistant - completes mundane tasks and formalises innovation activities into an acceptable form
The villain is working at odds (in some way) against the hero's quest	Foil - is in conflict with the protagonist	Monitor Evaluator. Objective, dispassionate. Thinks strategically. could be overly critical and slow moving.	The Critical Voice - the source of critique who introduces unconsidered issues and constraints
Also the villain	Antagonist - present the opposition against which the protagonist must respond.		The Traditionalist - emphasis on current processes and activity. Focus on ensuring these are completed 'correctly'
The dispatcher identifies the purpose of the quest and sends the hero off to undertake the quest.		Co-ordinator/ Chair. Ensures everyone is able to contribute to decisions. concern for fairness and equality. Clarifies goals, helps allocate responsibilities. Might over delegate. Articulates conclusions	The Manager - supports the initiation of new activity possibly without realisation or recognition that the result itself will be innovative
The princess or prize — the known positive opportunity that is only available upon the successful completion of the quest	Symbolic - a character whose presence represents a major concept or goal of society	Resource Investigators. Networker, well connected, facilitates access to resources, negotiator.	The Aspiration - is the embodiment of what can be gained or achieved with the problem solved successfully
The hero is the pivotal character against whom the other characters are defined through their relationship. Completes the quest and gains the prize (or princess)	Protagonist - The central person in a story. They are presented with a challenge or conflict which must be resolved	Specialist. Single minded. Dedicated. May have a tendency to focus narrowly on their own subject of choice.	The Innovator - the personification of the 'genius' of invention. Consolidator of disparate ideas to a final conclusion and realisation of the aspiration
	Stock - Characters who are recognisable because of their regular appearance in fiction	Teamworker. Concerned with group relations. Socially orientated and resolves conflict. Ingroup diplomat.	The Worker - a multiple character who is ever present even if they are not prominent within the narrative
The false hero may initially appear as the hero with the same goals and quest. Proves to be flawed or incapable of completing the quest and winning the prize		Shaper. Dynamic. Thrives on pressure. Pushes for decisions and action. Overcomes obstacles. Challenges others	The Alternative - a different route to a conclusion offering different appeal or capability. The difference between the Innovator and The Alternative may be the consequence of a single decision

Also The false hero	Anti-Hero - often the protagonist, who lacks higher purpose and focus of the hero	Completer Finisher. Eye for detail and spotting flaws in the plan. Always aware of progress and schedules. Emphasises the need to meet deadlines.	The Formalist - may be revealed as The Alternative or The Traditionalist. Focus is on operational activity being completed as expected and required. Innovation is not a priority.

Table 2: Comparison table of literature character types and their potential relationship to SFP

Understanding the characters utilised within the SFP is only one aspect of the deconstruction process. Recognising familiar characters, their tendencies to action and their relationship to other characters provides a certain level of understanding. However, Propp's work goes further and identifies the narrative functions that also regularly appear within fiction. There is a close relationship for Propp between character and function with individual functions potentially only available to certain characters. In order to deconstruct these narrative functions for a SFP purpose we also take the forty TRIZ principles identified by Altshuller (2005) as a similarly systematic analysis of product innovation based on the observation of Russian patent applications. Altshuller analysed each application and identified forty consistent principles that had been applied in order to produce genuine product innovation. Altshuller suggests that these principles are the basis of resolutions to a specific design contradictions that themselves can be identified from thirty-nine separate changing elements. For example, increasing the speed of operation of a product introduces the potential contradiction that this beneficial feature increases the weight of the product. Altshuller in this examples identifies four principles that could overcome this specific contradiction. TRIZ has some shortcomings that are necessarily acknowledged as part of the process of deconstructing SFP stories. The focus is primarily product based - this is partly a consequence of the basis of the original research which drew on observations of patent applications. TRIZ also relies on the key assumption that innovation is primarily a product of the resolution of design contradictions - in effect that for every improvement of a feature there is a decrement in another differing feature. Within the TRIZ perspective innovation is brought about as a satisfactory resolution of these contradictions.

To develop a systematic approach to the deconstruction of SFP we tentatively align Propp's narrative functions with the 40 TRIZ principles. We extend the primarily product focus of the existing TRIZ principles to incorporate a list of equivalent principles that can be applied to the innovation of services. From these observation we identify a broad set of SFP capabilities (Table 3) that can be discerned through the identification of Propp's narrative functions and their individual alignment with a specific principle for innovation drawn from the TRIZ approach. Reading the narrative functions indicates a progression to a capability or action. The purpose of the table is to identify potential progression from a science fiction story to its deconstruction and use as the basis for innovation. The connection between Propp, TRIZ and SFP is a relational one and not one of equivalency. In this way Table 3 can be read as a deconstruction table offering guidance as to how narrative functions can be read meaningfully in relation to innovation. Some

of Propp's narrative functions require inversion to be identified in relation to a TRIZ principle and to further identify the SFP capability. This is particularly the case around those functions identified and associated with the villain character. In the context of innovation - in which the villain character is identified with the Traditionalist and the Critical Voice - the functions undertaken by the villain represent a return to conventional operational activities and without inversion would represent a maintenance of the *status quo*. However, the overtly negative role of the fictional villain should be striped of the exaggeration and hyperbole of fiction to be read more carefully as the current state of affairs and environment.

Propp's Narrative Functions	TRIZ Principles (Product Focus)	Derived TRIZ Principles (Service equivalent)	Identified SFP capabilities
Liquidation - initial misfortune or lack is resolved	Taking out - separate an interfering part or property from an object	Remove/simplify components - present a reduced service	Remove* - a capability is removed from the existing environment
Absentation - A character leaves possibly in combination with the introduction of the hero	Segmentation - divide an object into independent parts	Decentralisation, modularise - separate functional aspects of a service	Break up - a whole is made into parts
Branding - the hero is marked in some way	Local quality - change an object's structure from uniform to non-uniform	Localise - position a service in relation to a specific sector or location	Mark - distinguish or make a capability distinctive
N/A	Asymmetry - Change the shape of an object from symmetrical to asymmetrical	Customise the service to individual choice or preferences	Focus* - move a capability from the general to the specific
N/A	Merging - Bring closer together (or merge) identical or similar objects	Centralise/agglomerate multiple services and offer as a single service	Join - make parts into a single whole
N/A	Universality - Make a part or object perform multiple functions	One-size fits all service that meets the majority of needs	Singular - one capability meets the needs of many
Complicity - the villain tricks the hero into doing something that appears to benefit the quest but ultimately benefits the villain	Nested doll - Place one object inside another	Encapsulate hidden services within other services. Automation of services.	Multi-purpose* - the capability of achieving multiple results with a single action
Villainy or Lack - the villain acts against the goals of the quest	*Through inversion:* Anti-weight - To compensate for the weight of an object, merge it with other objects that provide lift	*Through inversion:* Value-added service - the core service has other services added	Addition - adding further capabilities to an existing capability
Violation of Interdiction - the villain enters the narrative	*Through inversion:* Preliminary anti-action - respond to potential	*Through inversion:* Introductory or Loss Leader services	Contingency - a capability held in reserve in cases of negative action

	dangerous action before it occurs		
Reconnaissance - The villain attempts to better understand the situation with an examination of the environment	Preliminary action - Perform, before it is needed, the required change of an object	Being prepared - have clients interact meaningfully with the service prior to 'formal' use, e.g. free trial	Preparation - having capabilities ready to be deployed prior to it being required
Interdiction - the hero is given a warning	Beforehand cushioning - Prepare emergency means beforehand to compensate for the relatively low reliability of an object	Avert risk - automatic backup or failsafe aspects of the service	Shield - protect an existing or new capability
N/A	Equipotentiality - In a potential field, limit position changes	Simplify / Limit choice	Define - a closely constrained set of capabilities
Beginning counter-action - The initial response to the previously defined lack	The other way round - Invert the action(s) used to solve the problem	Transparency - enable clients to know the components of a service of to use/select/employ these in any order	Response - a capability that responds to the current circumstances and seeks to change them
N/A	Spheroidality - Curvature - Instead of using rectilinear parts, surfaces, or forms, use curvilinear ones	N/A	Reflexivity - to step away from the central issue and observe in retrospect
Guidance - The hero gains direction in their quest	Dynamics - Allow the characteristics of an object, external environment, or process to change to be optimal or to find an optimal operating condition	Configurable - the service can be changed by the client without additional input to improve the ultimate outcome	Shape - add capabilities to improve the final expected result
Difficult Task - A difficult task is proposed to the hero	*Through inversion:* Partial or excessive actions - If 100 percent of an object is hard to achieve using a given solution method then, by using 'slightly less' or 'slightly more' of the same method	*Through inversion:* Co-creation - enable clients to participate in creating the service and making the service functional	Shift - the capability is achieved in a different manner
Rescue - The hero is saved	Another dimension - To move an object in two- or three-dimensional space	Delegation - move part of the service away or use another service as part of the service	Retrieval - using capabilities that resolves problems or removes risk
N/A	Mechanical vibration - Cause an object to oscillate or vibrate	N/A	?
First function of the donor - The hero is tested and the	Periodic action - Instead of continuous action, use	Subscription - enable clients to dip in and out of	Frequency - a capability applied within specific

donor is introduced	periodic or pulsating actions	a service on a periodic basis	timeframes or with a defined regularity
Victory - The villain is defeated	*Though inversion:* Continuity of useful action - Carry on work continuously; make all parts of an object work at full load, all the time	*Through inversion:* Full service, concierge. Provide a complete packaged and seamless service	Longevity - a capability that continues into the foreseeable future
Struggle - Hero and villain are in direct combat *AND* Exposure - a false hero or villain is exposed	*Though inversion:* Skipping - Conduct a process , or certain stages at high speed	*Though inversion:* Selectivity, Premium - provide a high quality service that is perceptibly and quantitatively superior	Quality - a capability undertaken at the highest level of a specifically defined quality
Trickery - The villain attempts to deceive the hero or another character	*Though inversion:* 'Blessing in disguise' or 'Turn Lemons into Lemonade' - Use harmful factors to achieve a positive effect	*Though inversion:* Self-reflexive, self-parody - provide a service that doesn't take itself seriously e.g. lolcatz	Reflection* - a capability is considered and altered if required
Recognition - The hero is recognized (possibly a result of an earlier branding)	Feedback - Introduce feedback to improve a process or action	Feedback - seek client opinion and ideas	Reflection* - a capability is considered and altered if required
Mediation - A lack is now discovered by the hero	Intermediary - Use an intermediary carrier article or intermediary process	Intermediary - use another service in order to complete or link the current service	In between - a capability that sits between other capabilities
N/A	Self-service - Make an object serve itself by performing auxiliary helpful functions	Self-service - use client input to integrate and complete services e.g. Vistaprint	Self-service - a capability that requires no intervention
N/A	Copying - Instead of an unavailable, expensive, fragile object, use simpler and inexpensive copies	Mashup, sharing	Reproduce - a capability that can be repeated or that readily enables repetition
N/A	Cheap short-living objects - Replace an inexpensive object with a multiple of inexpensive objects, comprising certain qualities	Reduction - make the service more transparent by offering smaller services that can be accessed individually	Disposable - a capability with few resource requirements that is then discarded or destroyed
N/A	Mechanics substitution	N/A	?
N/A	Pneumatics and hydraulics	N/A	?
N/A	Flexible shells and thin films	N/A	?
N/A	Porous materials	N/A	?
N/A	Color changes	Customisation or	Focus* - move a capability

		configurable by the client	from the general to the specific
N/A	Homogeneity	Single service covers all eventualities	Multi-purpose* - the capability of achieving multiple results with a single action
Delivery - The villain gains information about the victim to the villain's advantage	*Though inversion:* Discarding and recovering	*Though inversion:* Service parking - enable a client to place a service 'on hold' until required	Discovery - a capability that enables discovery of the unexpected
Hero's Reaction - The hero reacts to actions of future donor	Parameter changes	Customisation or configurable by the client	Change - a capability is changed in response to the unexpected
Departure - The hero leaves	Phase transitions	Customisation or configurable by the client	Remove* - a capability is removed from the existing environment
N/A	Thermal expansion	N/A	?
N/A	Strong oxidants	N/A	?
N/A	Inert atmosphere	N/A	?
Transfiguration - The hero is given a new appearance	Composite materials	Composite service - a single service drawn from a collection of other (possibly existing) services	Alteration - a capability's composition is significantly altered in a beneficial way

Table 3: An alignment of Propp's and TRIZ analysis for deconstructing Science Fiction Prototypes

Read in combination deconstructing the story of the SFP is a relationship between the certainty of the current situation - the situation which the literary villain attempts to maintain or manipulate for their personal benefit - and the uncertainty but potential benefit of changing the situation and achieving the aspiration to broader social benefit - the fictional princess. Through this transition a series of barriers and challenges must be faced. It is the documentation of these problems and the means by which they are overcome that is the concern of literature and consequently SFP.

Conclusions

In contrast to commonly cited models of strategy and problem solving in which the prototyping process adopts a top down, organisational and planned approach. The Science Fiction Prototyping approach enables an inductive, reflective and emergent approach. We argue that stories of science- and speculative-fiction play a role in stimulating creativity and innovation within organisations. The potential opportunities come in a variety of forms (Figure 1) and we set

out here to extend the scope of Science Fiction Prototyping and its capabilities beyond those originally outlined by Johnstone (2011). Our presentation of SFP draws heavily on the use of situated studies originating with Goffman's theoretical position rather than the more predominant Parsonian concern with describing social practice. From this point of view much emphasis is placed upon the pre-established settings of the social and organisational environment. Technology, too, in this light, is presented deeply embedded within social and organisational contexts although science fiction generally offers little explanation of the earlier innovation and development processes although some revere the role of the inventor and their 'genius'. For example, in the Star Trek storyworld, Zefram Cochrane's role and significance as inventor is considered and even questioned within the potentially self-recursive plot of the *First Contact* film.

Our attention here is to take the narratives presented within science fiction and to identify a systematic approach to deconstructing these stories in a manner that lends itself to application within an organisational context. The claim that prototypes are a test of organisational vision and strategy (Bell et al, 2013) is particularly relevant and the claim that is pursued further by this paper. The necessary translation from a work of fiction - but more importantly of imagination - to strategy itself tests the organisation's ability and preparedness to innovate.

Furthermore, by identifying generalised characters types and capabilities an understanding of these types can be applied to the deconstruction of science fiction in a systematic way that can become meaningful to the organisation in organisational terms. However, the advantage of SFP is that the original work that contributes to this strategy is itself meaningful albeit in different terms. A conceptual view of the relationship between the characters of a story and the functions and capabilities that are being employed within the narrative can then be conceptually expressed for both the story and for an organisation as...

> *The prior environment/situations* [is changed by] *products/services* and *events* [used by] *actors* [that will or has altered the] *environment/situation* [and affects] *actors* [who face] *one or more challenge* [ultimately leading to] the *concluding environment/situations*

The analytical approach adopted and presented in the paper has been inspired by Propp's (1968) formal analysis of repeating functions in Russian literature and Altshuller's (2005) systematic review of regular patterns found within Russian patent applications. Deconstruction of creative narratives such as science fiction reveals the common functions, characters and inter-linkages found in the written piece and allows a generalised applicability of SFP to business planning. Utilizing deconstruction provides clear means to reveal examples of the forms and purpose of stories which can be drawn upon for SFP workshops.

The framework presented in the paper helps reveal the main themes of stories that can be

identified and therefore helps locate those elements of a story or story told that embed the complex day-to-day interchange and projection of the future.

Finally we have drawn from the TRIZ approach to present an applied interpretation of potential narrative functions so as to indicate the progression and potential in a story to a direct capability or action. Table 3 has identified this potential progression (and reading) from science fiction to its use as the basis for innovation. We have presented the connection between Propp, TRIZ and SFP as relational and not as a form of direct equivalency, elucidating the potential value in character and function identification. Table 3 presents a deconstruction in table form so as to offer guidance as to how narrative functions can be read as meaningfully in relation to innovation and prototype. The power of SFP lies in the many varied potentials that can be deconstructed from an individual story. The hero of one interpretation can become the villain in the next and when tested against varying organisational strategies the final articulated form of innovation found in the organisation and derived through SFP may be as varied as the number of science fiction stories themselves.

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