COLLABORATION THROUGH COMICS

Complete Research

Paul Beynon-Davies, Cardiff Business School, Cardiff University, Aberconway Building, Colum Drive Cardiff, CF10 3EU, United Kingdom, beynon-daviesp@cardiff.ac.uk

Abstract

This paper examines the role of design comics within business analysis. We first consider background to the use of comics within design work. This leads us to collate a number of advantages to using design comics as an intermediate and user-centric representation within acts of business analysis. We then describe our own use of design comics for making sense of socio-technical organisation and conclude with a discussion of the importance of comics within acts of collaboration between business analyst and organisational actors.

Keywords: Business analysis, socio-technical organisation, design comics, collaborative design.

1 Introduction

Frantz Rowe has recently argued that we need a richer diversity of genres within the Information Systems discipline (Rowe, 2012). The term genre was originally used to refer to a style or category of art, music or literature. More recently it has been applied in disciplines such as Organisation Science and Information Systems to refer to a meaningful pattern of communication (Yetim, 2006).

Within this paper our intention is to explore the nature of comics as an innovative genre within Information Systems. In particular, this paper examines the role of design comics as instantiations of a new design theory (Gregor and Jones, 2007) for business analysis. We have found comics useful as a medium for co-creating narratives of particular domains of socio-technical organisation. Such representations not only seek to make sense of what is currently going on; they also seek to make sense of what might be.

The structure of the paper is as follows. First, we consider background to the use of comics within design work. This leads us to collate a number of advantages to using design comics as both an intermediate representation and a vehicle for co-creating socio-technical organisation. We then describe our own use of design comics for making sense (Weick, 1995) of such organisation and conclude with a discussion of the importance of comics within acts of collaboration between business analyst and organisational actors.

2 Background

In this section we mine the scant literature on the use of comics within the information disciplines to provide background for our own use of these artefacts within collaborative acts of socio-technical design.

The term comic (although the plural comics is typically used) derives from the Greek *komikos* which means pertaining to comedy. Although there are precursors to the use of this genre such as the relief on Trajan's column and the work of William Hogarth in the 18th century, the modern idea of comics became established during the Industrial Revolution. It achieved its peak as a mode of expression alongside the emergence of related art forms such as movies in the early 20th century. More recently, comics have experienced something of a resurgence as a literary genre.

Essentially, comics consist of a sequential arrangement of both pictures and words. McCloud defines comics as '*juxtaposed pictorial and other images in deliberate sequence*' (McCloud, 1994). Comics for most of their history have been used as a medium for conveying narrative – telling a story (Eisner, 1996). Taken in its literal sense a story is simply a recounting of events. But stories frequently involve the weaving of character, context and the events themselves into a form of expression which is greater than the sum of its parts. Simmons (Simmons, 2001) provides a traditional Jewish allegory to demonstrate the power of narrative. '*Truth is turned away from every door in the village because her nakedness frightens the people. When Parable finds her huddled in a corner, she has pity on her and takes her home. There, Parable dresses Truth in story and sends her out again. Clothed in story, Truth once again knocks on the villagers' doors, and this time is readily welcomed into their houses*.'

This echoes the experience of Gershon and Page (Gershon and Page, 2001) who argue for the value of story-telling within information visualisation: '*A well-told story conveys great quantities of information in relatively few words in a format that is easily assimilated by the listener or viewer. People usually find it easier to understand information integrated into stories than information spelled out in serial lists…Stories are also just more compelling…*'.

During the 1930s Walt Disney started to use comics for the purposes of designing animated films. These types of comics are generally known as storyboards and the process of producing them within design as storyboarding. Storyboards continue to be widely used in the movie and advertising industries, particularly for the purposes of pre-visualising the sequence of action involved in a package of video (Van der Leslie, 2006). Such storyboards constitute visual scripts used by directors and cinematographers to plan action-sequences and identify potential problems before they occur. But these storyboards are also used for other purposes. Frequently, film producers will use a storyboard to convince potential financiers, search for film locations and even as an aid in casting. The construction of scenery, special effects and other ancillary material is also normally planned with the aid of a storyboard.

More recently the idea of storyboarding and comics more widely has been used within IT systems design, particularly web-site and interface design (Haesen, Meskens, Luyten et al., 2009). These types of comics are typically referred to as design comics and are normally used to visually encapsulate the 'action' involved in using a particular IT artefact. Gershon and Page (Gershon and Page, 2001) have even proposed building particular interfaces, such as those used for command and control, utilising an underlying metaphor of comics.

Our use of design comics is much broader in intention than the traditional storyboard. We have used such artefacts as an intermediate and user-centric representation within business analysis. Design comics as a business analysis technique lie somewhere between formal specification approaches such as BPMN for process modelling and informal narrative approaches such as a written description. In requirements engineering terms they employ notation for representing requirements over and above its structure in terms of some system. Design comics are also user-centric rather than technical-centric. They are particularly focused on the task of building common ground between the business analyst and organisational actors rather than in specifying in precise detail the workings of particular business systems. Common ground is the mass of knowledge, beliefs and suppositions that participants in some discourse believe that they share with one another. The purpose of such discourse is typically to advance, accumulate or update such common ground (Clark, 1996).

Design comics are particularly well-suited for the approach adopted within our design theory for business analysis. Business analysis is a significant activity within modern business practice and the term business analysis now appears to have subsumed and somewhat expanded upon the earlier term, *systems analysis* (Sidorova, 2009) (Sidorova, 2013). Along with this change in denotation, the definition of what business analysis means is undergoing something of a change: from a narrow focus on gathering and documenting requirements for IT systems to a more general approach for solving business problems in a methodical manner.

Business analysis for us constitutes the process of analysing and designing socio-technical organisation. Our approach to business analysis is founded in an explicit design theory which places actors (both human and non-human) and the way they enact three types of coupled action at the centre

of attention. The analysis and design of domains of organisation is also seen recursively as a collaborative act of co-creation between business analyst and organisational actors.

Comics are particularly useful as instantiations of our design theory for a number of reasons. First, they are both a visual and textual genre. Comics are a unique hybrid that can exploit in a freeform way the strengths of both images and text as media for portraying a coherent story-line (Gershon and Page, 2001). Second, comics are well-known and well-read as popular genre. Because of such familiarity, as intermediate representations comics appear to be readily accepted and understood by non-technical actors. Third, this genre is particularly well-suited for expressing the ways in which actors take action. They are also good at expressing the transformation resulting from particular actions. Fourth and finally, comics utilise well-established conventions for expressing events as 'movement' of action through time and space. Therefore, they offer a particularly useful way of expressing the dynamics of business patterns, such as routine work.

3 Comics and Socio-technical Organisation

We have been experimenting with the use of design comics both within acts of pedagogy and in short action research studies with different domains of organisation. We discuss the use of design comics within one such study in the next section. However, first we need to describe something of our design theory (Beynon-Davies, 2011) and the way in which this is reflected in design comics.

As mentioned in the previous section, we consider business analysis to be directed at the analysis and design of socio-technical organisation. The work described in the current paper is particularly directed at making sense of a specific domain of routine work enacted within a large manufacturing organisation. Here, we explain how such routines make sense as patterns of significant action.

Feldman and Pentland define an organisational routine as "*...a repetitive, recognizable pattern of interdependent actions, involving multiple actors…*" (Feldman and Pentland, 2003). They also describe routines as *"...generative systems that produce repetitive, recognizable patterns of inter-dependent action carried out by multiple participants…*" (Pentland and Feldman, 2008).

The generative nature of routines is explained through the distinction between routines in principle and routines in practice (Feldman and Pentland, 2003). A routine in principle "*...is the ideal or schematic form of a routine…*" (Feldman and Pentland, 2003). In contrast, a routine in practice *"...consists of specific actions, by specific people, in specific places and times…*' (Feldman and Pentland, 2003). This bilateral viewpoint on the organisational routine is seen to be consistent with Giddens' theory of structuration (Giddens, 1984). This means that routines in principle constitute resources for actors that enable and constrain the performance of routines in practice. Routines in practice constitute actual performance that create and recreate routines in principle.

To help ground our discussion let us consider a problematic routine enacted within the Royal Mint, a large UK manufacturing organisation that exports both mass-market and specialist tooled products to over sixty countries world-wide. Its main manufacturing plant currently has to shut down operation for a few days twice a year in order to perform a stock check. This is mandated as part of the audit process for the company which sets a target of 99% stock accuracy.

The process of checking inventory on a weekly basis (known as perpetual inventory checking) was introduced two years previously into the production plant in an attempt to directly improve stock accuracy. As a subsidiary goal it was hoped that if increased stock accuracy (to a level such as 95% stock accuracy) could be proven through this checking on a continuous basis then one of the two annual stock checks might be dropped, saving the organization 400,000 pounds sterling each year. However, stock accuracy currently sticks consistently at around 70% as measured in weekly stock checks across production units.

Perpetual inventory checking is a classic instance of an organisational routine (Lederman and Johnston, 2007). It involves multiple actors at various production locations in the plant including a director of operations, a stock controller, many different production clerks and production operators such as forklift truck drivers. These actors take inter-dependent action, meaning that one actor's

action is coordinated with that of others. It is repetitive action in that it takes place at different times in different production locations at least once per working week, continuously throughout the working year.

It is evident when observing and trying to make sense of a routine such as perpetual inventory checking that a number of the essential elements of the constructive conception of such socio-technical organisation provided by Pentland, Feldman and others actually remain problematic. First, the idea of action is left largely open-ended and relatively undifferentiated within the constructive definition. Routines tend to be conceived simply as collective habitual action (Cohen, 2007). Second, it is unclear what patterns of action actually mean in the constructive definition. In other words, it is unclear in what way routine acts inter-relate in patterns. Third, the constructive definition tends to equate the notion of actors solely with human agency. This ignores the role of machines and other technologies (particularly 'information technologies') as actors within routine work.

These unresolved issues are clearly not specific to the case of perpetual inventory checking. They help frame the problem-space we have experienced in attempting to engage with various organisational routines in different domains. They have been particularly important for us in attempting to analyse and design organisational routines in practice. This paper documents part of our attempt to provide some initial resolution to these issues. We want to propose that routines can be made better sense of as complexes of three distinct but inter-related forms of action, and that such forms of action entangle to constitute patterns and systems of socio-technical organisation. Further, that the interdependence or coordination of action relies on such entanglement, and that such patterns of organisation are produced and re-produced within networks of both human and material agency.

3.1.1 Action

Within our design theory actors (both human and non-human) constitute organisation through three layered patterns of action, which we refer to as formative, informative and performative action. Forma stands for the various ways in which substance is given form and consists of physical patterns combined into structures. Informa stands for the ways in which form serves to inform. Performa stands for the various ways in which informed actors achieve coordinated performance (Dietz, 2006).

Forma, informa and performa are enacted through formative, informative and performative action. Formative acts involve manipulating physical symbol (data) structures such as recording stock movements in an IT system. Informative acts involve communicating intentions with intensions (signs), such as directing a forklift driver to move a particular stillage. Performative acts involve the transformation of value, such as actually moving a stillage using a forklift truck from one production location to another.

3.1.2 Actors

It is only right to use the term actor for anything that can act. Modern organisation is clearly created out of the patterned inter-action between many different types of such actor. Much action within contemporary organisation is not enacted by humans but by machines; particularly by IT systems. This means that technical systems must be seen as significant actors within organisation.

Hence, in the case of perpetual inventory checking it makes sense to see the production IT system as a significant actor within this organisational routine. In particular, the organizational records of this IT system serve to assert and declare what Searle refers to as institutional facts (Searle, 2010) and such facts serve to direct action by a number of human actors such as production clerks and the stock controller. From the perspective of our design theory then, routines are not networks purely of social action. Many if not most organisational routines are networks of socio-technical action. Indeed, the routines are enacted as narratives of socio-technical action (Pentland and Feldman, 2007).

3.1.3 Patterns

A pattern is anything which repeats across more than one situation. By the patterning of order which constitutes organisation we mean first that formative, informative and performative acts recur in regular and repeating ways. We further suggest that such acts relate together in complexes which we refer to as formative, informative and performative patterns. Formative acts relate together in repeatable ways which we refer to as a formative pattern. Particular manipulations of data structures will serve to inform organisational actors within informative patterns. Such informative patterns make sense within a performative pattern. When these patterns achieve any reasonable size it becomes possible to think of them belonging to larger units which we refer to as performative, informative and formative systems.

Hence, an organisational routine such as perpetual inventory checking can be unpacked in terms of three entangled layers of action. Much of the nature of this routine work is given up to the manipulation of data structures such as stock records, STLQ reports, perpetual inventory count sheets and various types of electronic mail message. These formative patterns serve to inform participating actors. For example, a perpetual inventory count sheet directs a production clerk to check for certain stillages on the shop-floor. In turn, these informative patterns should help coordinate instrumental action within the production plant. They should particularly improve the management and flow of stock through various production units.

We have been developing a 'pattern language' (Alexander, 1964) which permits us to visualise recurrent patterns of the three-fold action described above. This pattern language can be expressed through various design comics: comics of formative, informative and performative patterns.

4 Formative Comics

The structure of a typical design comic is illustrated in figure 1. It is made up of a series of panels, with each panel consisting of one or more cells. The sequencing of cells normally follows some convention of presentation such as a right to left and top to bottom arrangement across the page. Each cell is generally used to represent a snapshot of action within an overall plot. A linked series of such cells is used to narrate the story-line within such a plot. When actors are represented, speech bubbles (to indicate external dialogue) and thought bubbles (to indicate internal dialogue) are typically attached to pictured characters. Captions are also attached in a more free-form way to cells and are used to convey additional message content over and above that conveyed by visualisation.

Because of limitations of space we focus upon describing how one layer of action from the domain of PI checking was made sense of using design comics. This is the layer of formative action.

As mentioned above, we use the term forma to stand for the ways in which substance is given form. For instance, consider a piece of coloured, magnetic material as substance. The substance, or series of substances, is given a form which has potential to inform. Hence, this magnetic disc may be placed at a particular position on a whiteboard. But to be informative a given piece of forma must serve to inform a certain actor. The actor must accomplish an act of in-forming (Boland, 1987) in terms of such forma. For example, within the case of an intensive care unit at an Australian hospital (Lederman and Johnston, 2011) the positioning of this token upon the ward's whiteboard informed nurses of the condition of a particular patient. Informed actors are provided with the potential to perform – to engage in coordinated, instrumental action with other actors. Reading such tokens within the intensive care unit helped coordinate the healthcare provided to patients by multiple care workers.

Any reasonably sophisticated piece of forma can be considered a hierarchy of structures, elements and items (Tsitchizris and Lochovsky, 1982). For instance, the manual whiteboard referred to above would be considered a data (formative) structure made up of a number of patient areas data (formative) elements. Each patient area is made up of a number of data items such as patient details included on a post-it note, annotations written with a marker pen and an optional magnetic coloured disc that can be positioned on the patient area.

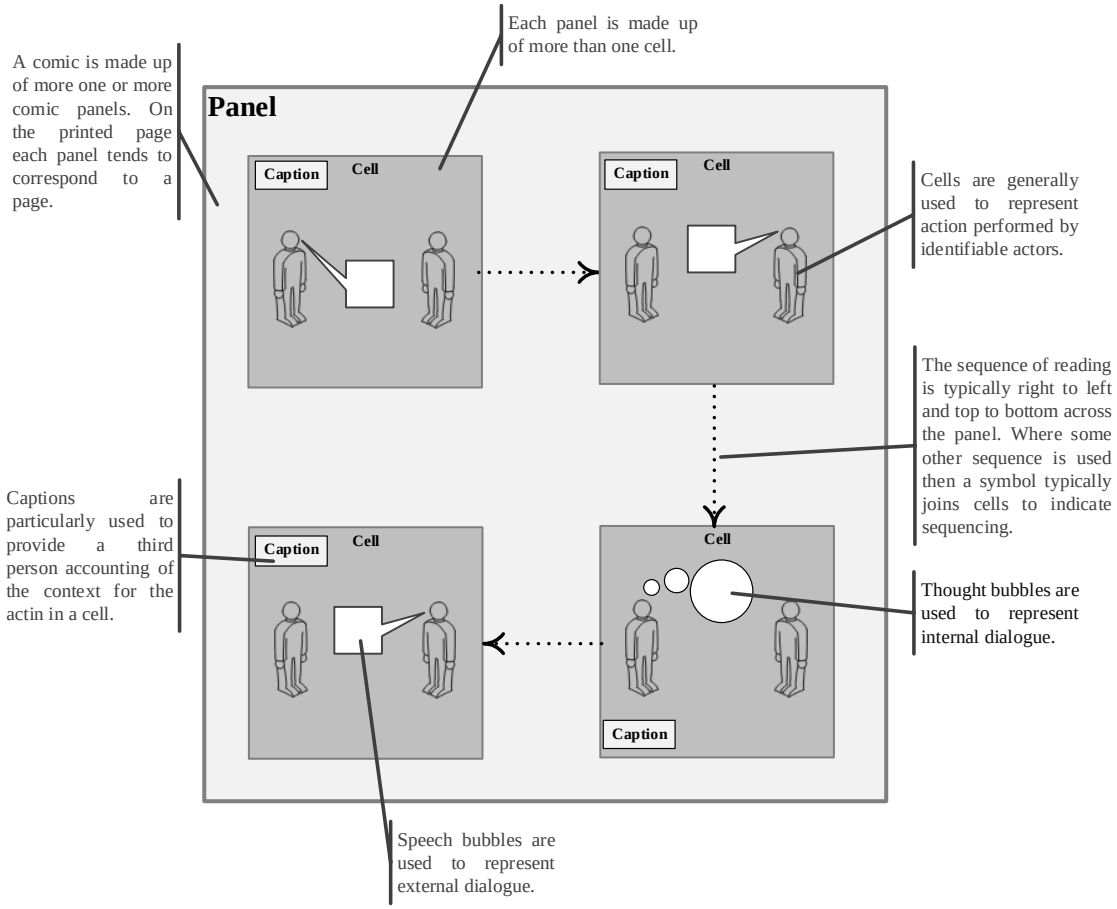

Figure 1. Elements of a design comic

Any reasonably sophisticated piece of forma can be considered a hierarchy of structures, elements and items (Tsitchizris and Lochovsky, 1982). For instance, the manual whiteboard referred to above would be considered a data (formative) structure made up of a number of patient areas data (formative) elements. Each patient area is made up of a number of data items such as patient details included on a post-it note, annotations written with a marker pen and an optional magnetic coloured disc that can be positioned on the patient area.

We can also consider the way in which formative structures, elements and items are manipulated by actors: how they are created or removed from existence; how they are updated or read by particular actors. Figure 2 illustrates the components we use to form cells upon design comics which are used to represent formative acts. Named mannequins are used to denote either particular human actors within routines in practice or roles in the case of routines in principle. Non-human actors such as IT systems are indicated with appropriate icons. Arrows are labelled with specific formative actions operating upon specific, named formative structures.

Within some particular routine, formative acts are clearly positioned in sequences of inter-related actions. For example, in the case of the whiteboard referred to above, a create formative act would involve taking one of the coloured magnetic disks and placing it close to a bed icon on the whiteboard. This formative item might be updated at some later time by changing the colour of the disk placed in this position. Finally, it might be deleted by being removed from the particular bed icon on the whiteboard.

In this example the three formative acts form a pattern which repeats on a regular basis and constitutes part of a wider formative system. The term formative system we use to denote the entire complex of formative patterns relevant to some domain of organisation. Within our design comics, cells are joined together in panels to indicate the temporal precedence of significant acts. Through this device,

such comic panels are used to represent both patterns and systems relevant to the domain of organisation under consideration.

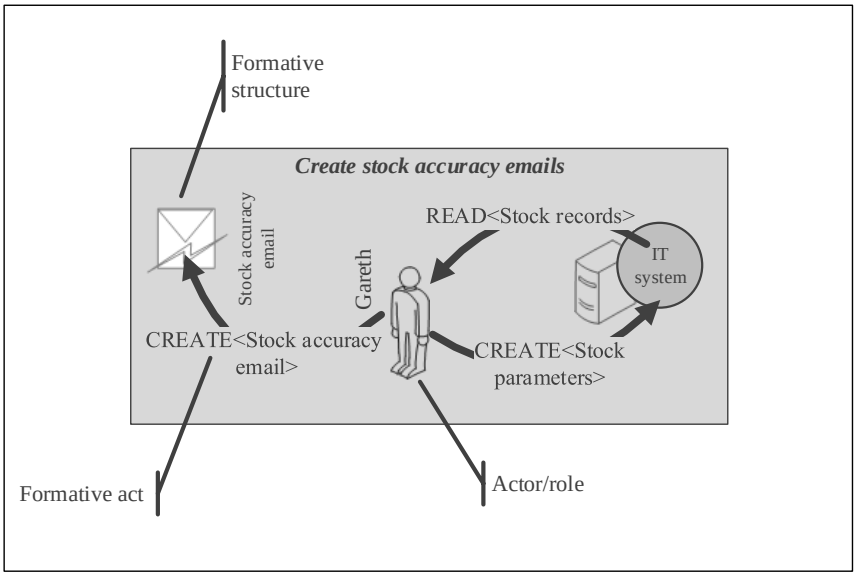

Figure 2. Components of a design comic cell

5 An Action Research Study

Our method for testing aspects of our design theory has been to engage in short events of action research with different domains of organisation. The essence of action research is encapsulated in its name (Avison, Lau, Myers et al., 1999): it operates under the dual imperative of action and research, of practice and theory (McKay and Marshall, 2001). Action research seeks to generate new knowledge through engagement with 'real-life' problem situations. As Baskerville and Myers state, *'unlike other research methods, where the researcher seeks to study organizational phenomena but not to change them, the action researcher is concerned to create organizational change and simultaneously to study the process*' (Baskerville and Myers, 2004).

As mentioned, the level of stock accuracy was a clear problem situation (Checkland, 1981) for a number of persons within the Royal Mint. To help understand why this disparity between levels of stock accuracy kept occurring, the author participated in an action research workshop along with representatives from various production units within the manufacturing plant. As part of this workshop the authors observed four perpetual inventory checks in practice conducted in different production units over the period of one working week. We also interviewed a number of key participants that either regularly enacted this routine or were impacted by the performance of this routine. This data collection was used as key input into building instantiations of our design theory.

In response to Cohen's (Cohen, 2007) call for better representations for the patterns of action constituting organisational routines, we have used design comics as a way of visualising the patterned actions suggested by our design theory. Within practical engagement with organisations we have found that this approach to visualisation makes it possible to co-create with organisational actors themselves a representation of a routine in principle from a close analysis of routines in practice. We have also utilised this approach to representation within the performance of design: the creative act of thinking through alternative ways of doing things. This approach to representation we believe moves beyond existing ways of representing organisational routines such as narrative networks (Pentland and Feldman, 2007). It also makes clearer connections to other modelling approaches more traditionally used within business analysis such as process modelling, information modelling and data modelling.

Within this section we describe a particular instance in which design comics were used to capture the dynamics of a particular organisational routine (Feldman and Pentland, 2003) in practice. These

representations of routines in practice were then used to build an abstraction of the formative pattern underlying this routine – a major aspect of the routine in principle.

As mentioned above, the basic cell within the design comics we utilise represents a significant act. Such acts may be concrete (relating to routines in practice) or abstract (relating to routines in principle) (Pentland and Feldman, 2007). We use the term scenario (Carroll, 1995) here to refer to a design comic which represents an actual and specific, observed pattern of action performed by particular actors within some domain of organisation. Representation of a range of observed scenarios is used to formulate an abstraction from a range of actual significant acts. In such representations of routines in principle one or more roles, whether human or non-human, enact particular classes of action upon particular 'objects' within the domain (Bijker, 2009).

Figure 4 illustrates part of the action that took place within one of these perpetual inventory checks. In particular, it represents one instance (scenario) of an actual observed pattern of formative acts enacted by actual persons - to which we have applied pseudonyms to protect confidentiality. In conventional written narrative we can describe the scenario of formative action in the following terms.

A perpetual inventory check is normally required of each production unit once per working week. Theoretically this can be scheduled at any time but in practice a set time is established for this activity for each production unit. In the case of production unit 1 a perpetual inventory check is set for 13:00 on a Thursday.

Gareth from the production planning department starts preparing for the perpetual inventory (PI) check of production unit 1 at 12:45 on this day. He begins by running an enquiry of the production IT system, inputting parameters of stock he wishes examined. From this enquiry, it takes him 10 minutes or so to decide upon the stock to be checked and to compile a perpetual inventory (PI) count sheet detailing this. This formative action completes at 12:55.

At 12:55 Gareth composes and sends an email to Helen, the production clerk at production unit 1. This email indicates that a perpetual inventory check should start at 13:10 and that the check should be made on the stillages identified in an attached PI count sheet. This PI count sheet indicates the start and end code or lot numbers of the stock to be checked.

Although this email is received almost instantaneously, Helen does not start the checking process until the indicated time of 13:10. At this time she first prints a report from the production IT system known as a stock location enquiry (STLQ) report within the range of lot numbers indicated by the count sheet. This report indicates where the stock should be located within the production unit. This formative action takes around five minutes to complete.

At 13:15 Helen then goes onto the factory floor and checks the stock by reading the stillage lot numbers off the labels attached to each stillage. If the indicated stock is present she annotates her printed STLQ report. The STLQ printout therefore acts as her record of the check being made. Helen then needs to enter details of the stock checked back into the production IT system when returned to the office. This pattern of formative action typically takes three quarters of an hour to complete.

On completion of her updates Helen composes and sends a completion email to Gareth within production planning. This act takes roughly five minutes.

At 15:00 on the same working day Gareth enquires of the production system and locates the updated stock records. This enables him to create an email detailing the level of stock accuracy determined in production unit 1 as well as any stock variances that need to be addressed by this production unit.

Helen is expected to attempt to address such variances within two working days. If such variances can be resolved then an email is sent from Helen to Gareth detailing the resolution. If variances cannot be located within the time-frame, then an email has to be sent from Gareth to Bob (director of operations) requesting authorization to write-off indicated stock.

Assuming authorisation is given then Gareth updates the stock records to record authorized variances. The entire pattern of formative acts completes at 15:10 on the Wednesday following the initial PI check. The following day this pattern of formative action repeats again.

A design comic was produced for each of four observed scenarios of formative action enacted in different production units within the manufacturing plant. This was done to capture any variations in the way in which this particular organisational routine was enacted across production units. Design comics were found to be particularly effective as a means of communication between the author and other organisational actors participating in the workshop. The visualisation advantages of pictures and the minimal set of constructs used was found important to opening up dialogue between the business analyst and organisational stakeholders. From this dialogue an overall abstraction was produced to make sense of the formative pattern currently being enacted within this domain (figure 4).

This, as well as two other coupled design comics describing the informative and performative patterns pertinent to perpetual inventory checking, were then used as a focal point for discussing a number of problems experienced with this current routine of action. The main reason that I, along with other organisational actors, paid detailed attention to this particular routine was that it was perceived as being dysfunctional. Rather than improving stock accuracy, perpetual inventory checking was continuously confirming stock inaccuracy. Discussion with organisational actors using the design comics described as tools for thinking through the problem situation soon highlighted a number of potential issues with the way in which this routine work was enacted. This led to a number of proposals for a new form of work which we began to document as a series of coupled design comics.

6 Conclusion

Within our current practice we have applied a simple approach to visually representing a particular domain of organisation, as well as bringing together such forms of representation within a design comic of coupled patterns of action. We have found this form of collaboration useful as a means of reflecting some collective sense-making about the nature of particular socio-technical organisation.

Van der Lelie (Van der Leslie, 2006) argues that '*storyboards provide a common 'visual' language that supports people from different backgrounds to communicate on aspects of design. Clients, members of the design team, experts and future users all can 'read' a storyboard*.' Our experience appears to support this contention. Comics are both visual and textual. They are a unique hybrid that exploits in a freeform way the strengths of both images and text as media for messages. Their presence within popular culture makes them readily acceptable by non-technical actors.

Design comics have proven particularly well-suited as vehicles for instantiating aspects of our design theory. Design comics focus upon actors and action and utilise accepted conventions for expressing movement and other forms of transformation. As such, we have found them effective as narrative devices – as means of telling the story of either how things happen or how organisational actors would like things to happen (Pentland and Feldman, 2007). We have used them both to summarise actual, observed events and to abstract from such events and provide a focal point for dialogue on the nature of technologically-enabled organisational routines in principle.

The Royal Mint study has proven particularly useful for confirming that our approach can be practically applied within the milieu of on-going project work. We also believe there is sufficient evidence from the case to demonstrate that such modelling is considered of value to project participants in terms of helping them make sense of organisation. Such models proved particularly useful within the case domain for challenging assumptions on which the existing order was based.

The researcher revisited the manufacturing facility some three months after the initial workshop. At that time the new business model had been implemented in one production unit. A series of short interviews were held with not only members of the original workshop but also with participants in the new way of working. Operation of the new way of working was also observed on the shop-floor. In interviewing a number of participants of the design workshop some months after the event positive comments were made about the usefulness of our approach. For instance, one participant said: '*We*

would not have thought of challenging the way we do things without the help of your approach..'. Another participant added: '*The insight your approach provided proved invaluable in getting the design right.*.' The director of operations reiterated that '*a continual problem with the old perpetual inventory checking was that stock accuracy at production locations consistently showed at less than 70%*'. The production manager in charge of the production unit operating the new way of working had this to say: '*The new process was initially implemented in one section of production in a matter of a few weeks with little expenditure…Since introduction of this new way of working stock accuracy is reporting consistently at 100% across production locations in my section…*'. He also mentioned that '*we plan to rollout this new way of working across all production units in the Mint*'.

Design comics as a form of intermediate representation are readily translated into the more formal representations characteristic of business analysis work. For instance, in previous work we have shown how information models are readily produced from a design comic representing some informative pattern (Beynon-Davies, 2013). Process models and data models may also be produced from other types of design comic that serve to make sense of some domain of organisation. Therefore, the design comics described in this paper are not a substitute for other more detailed approaches to modelling. In our experience such comics can open up an analysis or design-space as preparation for detailed modelling using more formal approaches. Nevertheless, comics do have one key advantage over traditional approaches to modelling within business analysis – they deliberately place actors (both human and non-human) and action at the centre of socio-technical analysis and design. This is an area which is lacking in the contemporary techniques available to the business analyst.

Admittedly we have applied this approach to collaborative design of socio-technical organisation in a limited range of settings. In terms of further verifying the efficacy of this approach in business analysis practice, it is our intention to investigate our particular variant of design comics as a vehicle for collaborative analysis and design within further action research studies. There are a number of research questions that we would like to further test in structured acts of intervention.

Our current experience suggests that story-telling appears to be a powerful way of making sense of organisation. Traditionally, stories are told as spoken or written narrative. In what way do certain modes of business analysis investigation such as the unstructured interview change with a focus on narrative? Can visualisation through comics become an approach of investigation rather than merely a way of representing the results of investigation? It is an open question whether the approach can be taught in detail to organisational actors themselves and what benefits might arise from placing this approach in the hands of such actors.

Alfred Hitchcock once described drama as '*life with the dull bits cut out*'. We have implicitly argued that when deciding how to construct a design comic it is usually best to start with the concrete rather than the abstract – with actual instances of organisational behaviour, either observed or imagined. We used the term scenario to denote such a patterned instance of action. Within the domain described in this paper we primarily constructed our scenarios through observing action on the ground. Another way of doing this, particularly within communication-intensive domains, is to collect actual instances of dialogues between actors. From a close examination of such scenarios classes of communicative pattern are likely to emerge. In other words, using such an investigative resource one should be able to abstract common ways in which people communicate. Another way of using scenarios is as a way of verifying business patterns. Collecting or 'walking through' scenarios in a structured manner is likely to be a useful way of conducting the acid test of whether a particular business pattern makes sense to organisational actors.

The idea of a pattern suggests that we can observe common ways of doing things across different domains of organisation. The very idea of patterns also suggests their reuse, perhaps as templates for establishing or benchmarking best practice. Traditionally, the notion of reuse and benchmarking has been applied using various technical-centric modelling approaches such as process modelling or information modelling. However, it should be possible to express common patterns utilising the design comics described in this paper. Would representation of such patterns in this manner make it easier for business actors to utilise the ideas of benchmarking and reuse? What role might such a pattern language play in the development of technologically-enabled business strategy?

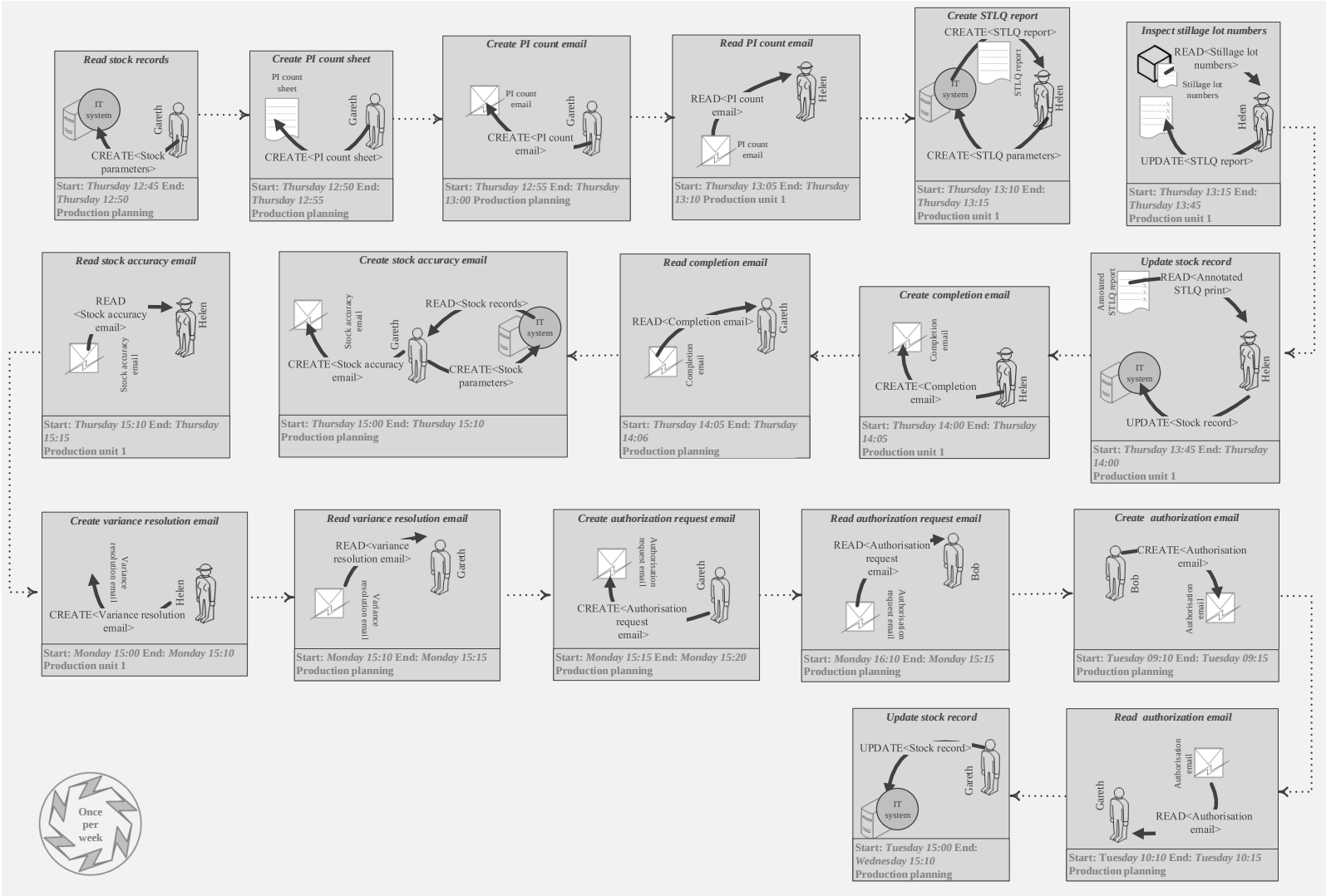

Figure 3. A scenario of formative action undertaken within perpetual inventory checking

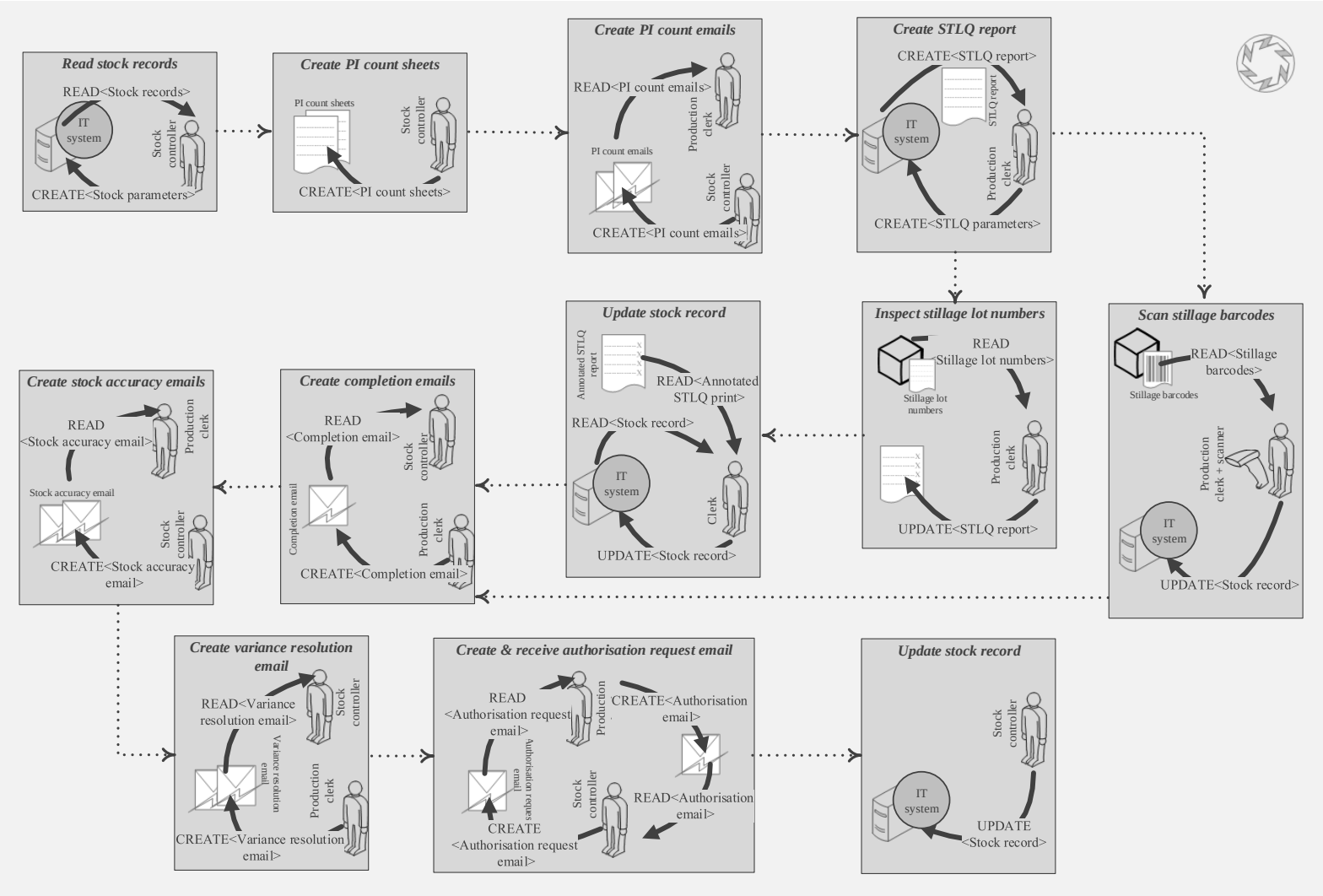

Figure 4. An abstraction of the formative system of perpetual inventory checking as a design comic

References

Alexander, C. (1964). Notes on the synthesis of form. Harvard University Press, Harvard, Mass.
Avison, D., F. Lau, M. D. Myers and P. A. Nielsen (1999). Action Research. Communications of the ACM 42(1): 94-97.
Baskerville, R. and M. D. Myers (2004). Special issue on action research in information systems: making IS relevant to practice. MIS Quarterly 28(3): 329-335.
Beynon-Davies, P. (2011). Significance: exploring the nature of information, systems and technology. Palgrave, Houndmills, Basingstoke.
Beynon-Davies, P. (2013). Declarations of significance: exploring the pragmatic nature of information systems. European Conference on Information Systems, Utrecht, Holland.
Bijker, W. E. (2009). Social Construction of Technology. A Companion to the Philosophy of Technology. J. K. B. Olsen, S. A. Pedersen and V. F. Hendricks. Wiley-Blackwell,Oxford, UK.
Boland, R. J. (1987). The In-formation of Information Systems. Critical Issues in Information Systems Research. R. J. Boland and R. A. Hirschheim. John Wiley,New York.
Carroll, J. M., Ed. (1995). Scenario-Based Design: envisioning work and technology in systems development. New York, John Wiley.
Checkland, P. (1981). Systems Thinking, Systems Practice. John Wiley, Chichester.
Clark, H. (1996). Using Language. Cambridge University Press, New York.
Cohen, M. D. (2007). Reading Dewey: reflections on the study of routine. Organization Studies 28(5): 773-786.
Dietz, J. L. G. (2006). The Deep Structure of Business Processes. Communications of the ACM 49(5): 59-64.
Eisner, W. (1996). Graphic storytelling. Poorhouse press, Tamarac.
Feldman, M. S. and B. T. Pentland (2003). Reconceptualizing organizational routines as a source of flexibility and change. Administrative Science Quarterly 48(1): 94-118.
Gershon, N. and W. Page (2001). What storytelling can do for information visualisation. Comm. of ACM 44(8): 31-37.
Giddens, A. (1984). The Constitution of Society: Outline of a theory of structuration. Polity Press, Cambridge, UK.
Gregor, S. and D. Jones (2007). The Anatomy of a Design Theory. Journal of the Association for Information Systems 5(2): 312-355.
Haesen, M., J. Meskens, K. Luyten and K. Coninx (2009). Supporting mutlidisciplinary team and early design stages using storyboards. Human-Computer Interaction 5610: 616-623.
Lederman, R. and R. B. Johnston (2007). Are Routine Manual Systems Genuine Information Systems? Information Systems Foundations, Theory, Reality and Representation. D. N. Hart and S. D. Gregor. Australian National University Press.,Acton, Australia.
Lederman, R. and R. B. Johnston (2011). Decision support or support for situated choice: lessons for system design from effective manual systems. European Journal of Information Systems 20(5): 510-528.
McCloud, S. (1994). Understanding comics: the invisible art. First Harper, New York.
McKay, J. and P. Marshall (2001). The dual imperatives of action research. Information Technology and People 14(1): 46-59.
Pentland, B. and M. S. Feldman (2007). Narrative Networks: Patterns of Technology and Organization. Organization Science 18(5): 781-795.
Pentland, B. and M. S. Feldman (2008). Designing routines: On the folly of designing artifacts, while hoping for patterns of action. Information and Organization 18: 235-250.
Rowe, F. (2012). Toward a richer diversity of genres in Information Systems research. European Journal of Information Systems 21(5): 469-478.
Searle, J. R. (2010). Making the social world: the structure of human civilization. Oxford University Press, Oxford.

Sidorova, A. (2009). Business analysis in the Information Systems Curriculum: Implications of Business Analysis Professionalization. Americas Conference on Information Systems. San Francisco.

Sidorova, A. (2013). Business Analysis as an Opportunity for IS Programs in Business Schools. Communications of the Association for Information Systems 33(31).

Simmons, A. (2001). The story factor: secrets of influence from the art of storytelling. Perseus Publishing, Cambridge.

Tsitchizris, D. C. and F. H. Lochovsky (1982). Data Models. Prentice-Hall, Englewood-Cliffs.

Van der Leslie, C. (2006). The value of storyboards in the product design process. Personal and ubiquitous computing 10(3): 159-162.

Weick, K. E. (1995). Sensemaking in Organizations. Sage Publications, Oxford.

Yetim, F. (2006). Acting with genres: discursive-ethical concepts for reflecting on and legitimating genres. European Journal of Infomation Systems 15(1): 54-69.