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The simulated traces of action - B.I. and reflection through technology

Abstract:

Business Intelligence can be interpreted as a compensation for the growing complexity of technical support in economic transactions. With the help of sophisticated calculation and analysis tools, the business situation is simplified for the user in order to enable reasonable decisions. However, the simplicity of Business Intelligence is only simulated by hiding the system operations under the surface. This causes a disruption of the general concept of reasonable action. The notion of responsibility disappears between the business expert and the systems engineer. A possible solution to this problem is to change the system design process and to introduce competing technology which could show new traces of the system operation.

Agenda

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An ethical challenge

Business Intelligence has lately become a very popular term in information technology. As it happens with popular terms, a variety of different applications are subsumed within BI. In a broad sense, every kind of tool that processes economic information can be called Business Intelligence: data extraction, transformation and loading procedures in a data warehouse, data marts, data mining tools, planning and optimization systems. In a specific sense, Business Intelligence is narrowed down to Online Analytical Processing (OLAP), Management or Executive Information Systems (MIS / EIS) and special front-ends with sophisticated reporting and planning functionality[1]. Being called Business Intelligence, all such technology should show a common characteristic. Since its technical design is quite diverse, this characteristic can only be found in the field of application: Business Intelligence is used to support business decisions. In other words: BI describes a certain activity, not a certain technology. It would not have been necessary to coin a new term just to describe how the computer systems mentioned above work and what can be done with them. Business Intelligence marks a change of perspective to their application: IT is now considered as an essential element of the process of decision making itself. With Business Intelligence, we are not only able to decide better or more efficiently. We are able to decide in a completely new way, sharing the authority for our decisions with the technology we use. Where this happens, the usage of IT creates an ethical challenge.

Ubiquity and intransparency

The last two decades have brought a major change to the role of IT in business practice[2]. Before that time, access to the information necessary for sound business decisions had been rather limited. The storage and the exchange of business data were slow, poorly coordinated and costly. Limited data availability was a severe restriction on the possibilities of how and where to do business. With the introduction of powerful computer systems, data warehouses and communication networks, this problem disappeared. It became possible to store and transmit any commercial information that appeared in a business transaction. Similar data from different sources could be amalgamated, consolidated and aggregated; complex interactions between business processes could be identified, analysed and managed. Without this progress in IT, the recent growth of international markets, outsourcing, globalisation and worldwide supply and production networks would hardly have been possible.

However, this development had an important side effect: All business processes were penetrated by technical applications. As much as IT has enabled economic growth, it has become an irreplaceable part of it. Distributed production facilities, off-shore services, electronic payment, individual consumer response and network management all depend on the availability of information technology. Without electronic data processing, business as it is performed today would not only be slowed down or have a lower level of efficiency; it would be impossible. In today's world, IT is present everywhere and its contribution to our actions is so sophisticated that we hardly even realize it[3].

Decision making and orientation

Limited information has an important advantage: decisions are much easier. With a growing number of interrelated variables and data instances, it becomes increasingly hard to understand what consequences a decision might have[4]. Modern distribution and supply networks, for example, have often reached a complexity where sophisticated products assembled with parts from dozens of different suppliers are produced for other dozens of different markets. The automotive industry had a leading role in this development: in recent years, the number of car models has more than tripled, various additional features for safety and comfort have become standard in modern automobiles and many new markets have emerged which require

[1] See Gluchowski, P. et al.: Management Support Systeme und Business Intelligence or Michalewicz, Z. et. al.: Adaptive Business Intelligence.

[2] See e.g. Kamper, H.-G. et al.: Business Intelligence – Grundlagen und praktische Anwendungen.

[3] Gamm, G.: Technik als Medium, pp102; Hubig, Ch.: Die Kunst des Möglichen I, pp186.

[4] See English T. M.: Optimization Is Easy and Learning Is Hard in the Typical Function or Cantermann A.: Handeln in komplexen Zusammenhängen.

special attention[5]. Under these circumstances, it is generally impossible to find optimal solutions to a decision problem with analytic methods of conclusion. Many companies have therefore introduced advanced planning systems which achieve good solutions in an acceptable time frame, but at the price of missing formal representation. Determinate analytical conclusions become impossible. The decision maker can justify the solutions only by the fact that nothing better can be found[6].

The users of huge data warehouses have to face a problem which looks in many ways rather similar. A large amount of data from various sources, generated in different ways, has been adapted, consolidated and transformed within the warehouse. Each set of data can undergo hundreds of different routines during which it can be rejected, replaced and/or changed. The end result of these routines cannot be verified by the user. Data mining tools and other analysis methods add further procedures for pattern recognition and pre-selection of data volumes. Data processing with such tools does not necessarily cause errors. In fact, the tools will usually offer the most – if not the only - accurate way available to treat the data. However, for the very reason that they enable work that would otherwise not be possible, they also change the meaning of technology: The most defining aspect of it, its determinacy, disappears.

Technology and reflection

Is has recently become popular to consider technology as an essential aspect of the human being in the world. In this sense, technology is "humanity at work"[7]; technology is the general mode of human action[8]. Much of these ideas can be traced back to Friedrich Hegel and the image of human action becoming external. With technology, an action is executed at a distance from the actor, which makes it possible to control it and reflect upon it[9]. In fact, it seems that reflection in general needs an external point of view. If this is true, the distance to ones own actions is in fact an indispensable aspect of establishing oneself as an actor at all. The determinate structures of cause and effect in technical operations provide such a distance. Technology therefore shapes our thinking in general. It is, as Christoph Hubig puts it, a term of reflection[10].

While technical determinacy thus seems necessary to reflect on action, reflection itself is necessary because of the indeterminacy of action. Inasmuch as an action intends to change one state of the world into another, its technical expression will always remain incomplete. Whatever happens in the course of the action will exceed technical description. Most of the time, the result and the intention of the action will not be identical. It was also Hegel who pointed out that the difference between the two is actually essential for human reason[11]. If there were no difference, the actor would not be able to distinguish between him/herself as the master of the action and the application of technology as its execution: If the means always achieved the end, no distinction between the two would be possible.

From a mere technical perspective, it is enough to consider the user in as far as he/she has an impact on the operation of the machine. In case of Business Intelligence, this means that the user is the source of the information that initiates and controls the course of the following calculations. There is no inherent need in technical thinking to give the user insight into the execution, because everything that happens has already been determined by the input. Whether the result of the calculation is displayed to the user, to another person, or whether it disappears without a trace does not matter for technology. However, considering what has been said above, it matters quite a lot for human action. Without traces, it is impossible for the user to tell the difference between the intended effect and the actual outcome.

[5] Recent figures in VDA: Auto-Jahresbericht 2007 and ISI: Deutscher Delphi-Bericht zur Entwicklung von Wissenschaft und Technik

[6] See Meyer C. M.: Integration des Komplexitätsmanagements in den strategischen Führungsprozess der Logistik and Gerberich C. W.: Managen der Komplexität und Dynamik.

[7] Pitt, J.: Thinking about Technology, p11.

[8] Fischer, P.: Philosophie der Technik, pp32.

[9] Hegel, G.W.F.: Phänomenologie d. Geistes, pp140.

[10] Hubig, Ch.: Die Kunst des Möglichen I, p230.

[11] Hegel, G.W.F.: Phänomenologie d. Geistes, pp294.

The loss of traces

With Christoph Hubig, we can describe this problem in today's technology as a loss of traces[12]. The permanent presence of complex and interactive technical applications in our life makes it increasingly hard to distinguish determinate technical procedures from their environment. Separate effects cannot be associated to separate operations. As a consequence, the authority of the user over the application of technology vanishes. We cannot distinguish our objectives as a user from the operation of technology any more. Instead of saying that we work with technology, we can now only say that we initiate it or and run it.This would not be such a problem if technology were complete – if it covered the user's complete view of the world. But in reality, most of the background of a given situation will remain implicit to the application of the technology. All input to a calculation will always be an approximation, not only because of time and storage space, but also, because explicitness can only be achieved by the very means of technology itself.

Taking a closer look, the simplest numeric data that are input into technical systems convey some sort of approximation. Putting daily sales figures into a data warehouse, for example, seems to be a quite straightforward activity, but even here, space is left for interpretation e.g. whether a sale refers to a verbal agreement, a signed contract or a transfer of goods. The description of the customer, the product itself, or the point of sale might give cause for additional questions. In a direct conversation, one might sooner or later understand in general what information is expected. In front of a computer screen, this remains unclear. Nobody knows who will use the data and to what end, and at the other side of the system, background details concerning the data input remain invisible, too.

Similarly, the preferences put into a search system might be honest expressions of what the user thinks at that moment, but quite certainly there will be further, implicit understandings that these preferences only hold within certain boundaries and that some features in the search space will take precedence over others in case of a conflict. The user might not even know all this. If he/she were searching on his/her own, this would hardly matter, but in this case, the system executes the search. Seeing the result, the user cannot tell how many of his/hers implicit understandings have been complied with or where the search would have ended with just slightly different preferences.

The simulated traces

Where the concepts of action dissolve in the size and complexity of technical operations, the only way to restore human authority over systems is simplification. Ubiquitous and intransparent technology that has become indeterminate has to be broken down into separate pieces over which the users re-establish their authority. Such a deconstruction, however, would severely diminish the benefit of technology. In fact, most of the efficiency that the latest technical developments achieve seems to be gained as a trade-off against human control.[13] For a society whose economy is based on constant expansion, this would cause a fundamental contradiction. Business Intelligence therefore provides another solution.

Online Analytical Processing of the information in a data warehouse allows the user to navigate more easily through huge data volumes, to aggregate data and condense them into variable, simple reports. Routines of automatic data consolidation and adaptation in the initial phase enhance the quality of user input and smooth out mistakes and contradictions. Management Information Systems use optimized graphical data presentation and standard reporting layouts (e.g. the famous balanced scorecards) to point out the most significant issues for business decisions. Context sensitive search routines and forecasting by simulation introduce replacements for the general knowledge of its users inside the systems. In order to support human decisions, Business Intelligence thus hides in many different ways the size and complexity of technology behind simplified interfaces. In other words: Business Intelligence does not restore authority over the original technical operations – it compensates for their disappearance with the introduction of new environments of action on top of the technology. With Business Intelligence, it becomes possible to work on the focal points that are provided to the users. Pressure can be put on the areas with critical performance figures; preferences for planning can

[12] Hubig, Ch.: »Wirkliche Virtualität«, pp53.

[13] See also Wiegerling, K.: Philosophische Aspekte der Mensch-Technik-Interaktion. Whether or not some technical artefacts have to be treated like autonomous actors, as e.g. in ANT, is not to be discussed here.

be setup in a more sophisticated way. And the systems do present traces of the action with the change of the figures and the simulation of planning results. However, these traces are not the traces of the underlying technology, but only their simulation at the surface where the Business Intelligence is installed.

IT experts, users and morality

The typical data warehouse has at least three different layers of data, one for input, one for transformation and one for output. Additional layers for input control, logging and output consolidation are becoming more and more popular. Business Intelligence with OLAP and MIS is restricted to the data in the output layer, automatic routines to the transformation layer. Whatever happens before remains outside the scope. Systems for advanced planning, forecasting and simulations make it easier to express preferences for the calculations and to check the results, but they do not affect the procedures of the calculation themselves. Considering this, it becomes clear that the problem of authority over the action is not solved with Business Intelligence; it just shifts it elsewhere. The critical point is not the usage of the system any more but its implementation. The user does not have to bother about dealing with technology any more, because everything has become easy. Instead, the systems engineer now carries full responsibility for ensuring that the system gets simplified correctly.

The typical company structure sets departments for information technology apart from business units. In addition, most projects for the implementation of Business Intelligence are run by external experts. Even if these experts have a professional training in economy, they lack the specific competence and experience to take responsibility for the business transactions of the company. This duty falls on the business unit. But in case of Business Intelligence, the user's decisions are interconnected with the design of the system. What the user thinks is right depends on the consolidation procedures, aggregation methods, search routines and presentation techniques implemented in the system. At the same time, the only person able to build and change the system and to tune its performance parameters is the IT expert.

The pragmatism of provisional ethics

Considering the loss of traces in today's technology, Christoph Hubig suggests a new pragmatism to sharpen the terms of our decisions with respect to the practical relevance they might have for our actions[14]: we should use our freedom of choice to establish those concepts of action that seem necessary to us in the world. As soon as they are clarified, we have to shape our technology accordingly to confirm them. This is to be achieved by the intentional setting up of boundaries for technical applications. First, the range to which technology penetrates our life should be limited. Second, a possibility to establish transparency in the system should be available "on demand": According to the Stuttgart concept of Parallel communication, fractions should be introduced in the permanent flow of technology wherever it is necessary to assure access to determinate operations.[15]

Applied to Business Intelligence, this could mean that the course of system development has to be inverted. Instead of additional systems, which are added on top of an existing architecture, the design of the applications for Business Intelligence should take precedence. BI should not make sense of the data available; it should make data available in a sensible way. As a consequence, the engineer should follow the lead of the business experts and at the same time require their participation in all further endeavours to improve and expand the technical architecture. Many common approaches to software development, e.g. requirements engineering, already incorporate these suggestions[16]. In other cases, e.g. rapid prototyping, it is represented as a feedback circle spanning over the complete range of the engineering project. However, the application of these methods is often incomplete. It stops before the underlying complexity of data warehouses, search algorithms etc. is addressed.

It still remains unclear in what way fractions in the permanent flow of technical operations can be introduced, because they appear as mere obstructions to efficiency. One solution might be the introduction of competing technology. Fractions then are differences between separate systems. While these differences may not resemble the traces that a technical operation leaves in a given reality, they still allow reflection on the effectiveness of the technology, which can lead to the desired separation

[14] Hubig, Ch.: »Wirkliche Virtualität«, 60.

[15] Wiegerling, K: Das Grundproblem des UbiComp und das Stuttgarter Konzept der Parallelkommunikation.

[16] Hood, C. et al: Requirements Management, pp10.

of means and ends. The traces of action still remain simulated, but they appear now between separate technical applications and not within a single one.

Business experts and system engineers

Ubiquitous, intransparent IT challenges rational decision making and acting, because the traces of the action in the real world disappear. Without these traces, technology loses its determinate quality. As a consequence, it becomes difficult to assign responsibilities in the usage of IT. Economic decision makers are greatly affected by this problem, because they work with complex and dynamic IT systems and huge amounts of data. In many situations, decisions are made under circumstances which do not allow their reflection according to their outcome. Technology then loses its status as a separate determinate instance between the actor and the world.

BI systems can be understood as a compensation for this problem. They restore the possibility for their users to decide and act rationally. In order to achieve that, they simplify the decision making situation at the front-end by excluding the complexity of the preceding layers of technology. For the user of these systems, it seems as if all the insoluble complexity issues have disappeared. However, they have just been shifted to the systems engineer. The engineer is concerned with technical efficiency, but the implications of the content of the system for business decisions will remain largely unclear. As a consequence, neither the business expert nor the engineer has the necessary insight to take responsibility for the decisions to be made with the system. In such a situation, moral behaviour seems practically impossible. Hubig's concept of provisional ethics implies that a solution might be given by the inversion of the course of system design and the pluralism of technical applications. In this way the authority of the user of Business Intelligence over his/her actions might be able to be restored.

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