Asking Why

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Abstract. In this paper, we illustrate the impact of simple Why questions as a means to reveal global aspects that may easily be forgotten during traditional requirement analysis. For illustration we use the introduction of the General Data Protection Regulations (GDPR), a prime example to observe that adequate solutions may require to think out of the box, beyond just stepwise trying to fulfill individual requirements. Our Why analysis revealed the traditional, scattered data handling as the essential bottleneck, which we believe can be overcome by a cloud-based knowledge management across departments and applications.

Keywords: Why analysis · Alignment · Wicked world · VUCA · Knowledge/Data management · GDPR · IT infrastructure · Requirement analysis · DevOps

1 Introduction

A Gartner report from 2020 (p. 3) found that today's "business environment (is) marked by significant change, competition, uncertainty—and opportunity" [1]. This underlines that we live in a wicked world challenged by the VUCA characteristics in which learnings from the past do not ensure correct predictions for the future [2–4]. VUCA stands for vulnerability, uncertainty, complexity and ambiguity [5]. Organizations face constant changes and developments of their industries due to e.g., new trends, regulations and technologies and are forced to adapt to ensure their survival in the long-term. These constant changes increase the *vulnerability* and unpredictability of an industry's further developments leading to great *uncertainty* and thus challenges for an organization's management. Each strategic decision needs to be carefully designed and analyzed as potential scenario for the future which requires interdisciplinary collaboration and alignment. The interdisciplinary collaboration and its imposed stakeholder diversity enhance the *complexity* and *ambiguity* of decisions which are often interpreted differently due to stakeholder-specific expertise, interests and opinions [6].

The more factors and aspects are considered the less it becomes obvious what to emphasize and what the right/logical thing to do is. The challenge is to consider sufficient aspects/facts/trends while simultaneously preventing to run into the '*cannot see the forest for the trees'* dilemma. To support the strategy development and guide the brainstorming sessions business experts have defined many frameworks, methods and schemata like canvases. In particular, canvases are useful as they allow one to successively focus on

specific issues without losing the global overview during the planning phase (see the Business Model and Platform Alignment Canvases [7, 8]).

On the other hand, the planning-based approach often leads organizations to prematurely decide on implementation steps which is contra-productive in the VUCA world. Here change-driven approaches are advantageous which are based on continuous creativity, collaboration and validation to enable interdisciplinary innovation and learning in an evolutionary fashion in the sense of *'survival of the fittest/most adapted to today's environment'* [9, 10]. Change-driven approaches continuously modify their initial plan based on new learnings – or VUCA developments - over time according to a global vision - a *why* (do we do this)?. They then define the global goal - *what* (do we want to achieve)? The combination of vision and goal constitute the pillars to define a milestone-based roadmap.

Change-driven approaches are characterized by only committing to what is necessary at each point in time to provide sufficient leeway to adapt measures and milestones based on new learnings. This enables an open-minded and solution-driven continuous as-is and should-be comparison approach that reacts to identified deviations in an agile fashion.

In order to demonstrate the difference between the plan and change-driven approaches of either committing to plans or to visions this paper analyzes how organizations typically reacted to the introduction of the General Data Protection Regulation (GDPR) in May of 2018. It turns out that organizations try to avoid invasive changes and accept obviously unsatisfactory solutions despite the fact that GDPR already led to individual fines of up to €746 million in 2021 [11]. We will argue that this is mainly due to the organizations being caught in their traditional IT infrastructure and mindset which is inadequate to live up to typical GDPR requests like erasing all personal data of a certain person. This leads us to the main research question addressed in this paper:

> *Can implementing the GDPR regulations be considered*
> *an IT problem, and if so, what has to be done?*

We will illustrate the power of (continuously) asking *Why* in a change-driven approach. In fact, many important Why's only arise during implementation and may lead to significant reconsiderations.

The next section therefore reviews the state of the art of many organizations, while Sect. 3 concerns the GDPR regulations, typical implementation (Sect. 3.1), a Why-based analysis of the corresponding design decision (Sect. 3.2), and a solution proposal. Subsequently, Sect. 4 provides a generalized discussion of the issues, and Sect. 5 our conclusion.

2   State of the Art

In this Section we introduce the constant external changes imposed on organizations. Then we dive into the state of the art of organization's internal knowledge management practices.

2.1 Today's Challenges of Organizations

"Across many industries, a rising tide of volatility, uncertainty, and business complexity is roiling markets and changing the nature of competition" [12, p. 7]. To survive, organizations need to rethink their strategies, business models and dynamic capabilities referring to their agility with regard to how fast and how well they can adapt to change [13]. Despite these pressures most organizations tend to address this change traditionally in the sense of "Why shall we change? We have always done it (successfully) this way". External pressures like Industry 4.0 either get ignored or addressed in an incremental almost "alibi" fashion via digitizing processes and documents or adding cloud services. These steps are considered Industry 4.0 measures and allow organizations to preserve what they currently excel at. Unfortunately, this approach misses to leverage the Industry 4.0 potential [14].

It also ignores the threat around the corner that established organizations and even market leaders are just one competitor's revolutionizing innovation away from significantly be threatened and potentially even forced out of the market [15]. Christensen calls this calm before the storm the innovator's dilemma [16, 17]. It underlines that once today's established organizations were the innovators, but as soon as they became successful, they lost their innovation potential and became "traditional" organizations. This approach is successful as long as no competitor outperforms the others. However, with every innovation it can be too late for established organizations bound by their legacy, as it can take them years to catch up.

One often ignored factor is that disruptive innovations with revolutionizing potential start targeting only very dedicated niche segments outperforming current offers at one particular functionality and/or service but underperform at most others have the potential to catch up with and even leave the established competition behind [18]. These disruptive innovations often are mistakenly overlooked as e.g., Kodak's ignorance of the digital camera opportunity [19], and so are the disruptive innovation-"makers". These organizations are often unknown potential industry entrants and thus not taken seriously. However, Porter made an important observation when he stated that each industry is driven by five forces: direct competition, customers, suppliers, substitutes and potential entrants [20]. New potentials and technological trends like Industry 4.0 and digitization open e.g., manufacturing industries to novel IT and software innovations. One has to understand the strategic potential of software and software-driven business models like digital platforms. They e.g., deprive established organizations of the direct contact with their customers and are therefore a major unstoppable threat. Great examples are Amazon for retail and Booking.com for hotels. Especially, IT and software create opportunities which significantly reduce the entry barriers for substitute providers and potential market entrants. And this is not all – they cannot just enter but overtake the market.

2.2 Today's Internal Knowledge Management Challenges

Already in the early 2000s estimated the IDC an annual loss of about $31.5 billion due to ineffective knowledge management for the US Fortune 500 organizations alone [21]. This indicates the competitive advantage of teams being able to access the relevant expert

knowledge [6, 22]. The unsatisfactory state-of-the-art of knowledge management (KM) is due to four categories of knowledge management barriers: organizational, technology, individual and semantic [6].

Organizational barriers cover e.g., the missing integration of KM strategies into an organization's overall vision and strategy, competitive culture and missing adoption of KM systems. Technology barriers comprise the lack of a global and connected IT infrastructure, limited access to knowledge sources, mismatches between needs and solution and missing user-friendly tool-support. The individual barriers address employee's lack of trust, hesitance to share knowledge and lack of time and resources to do so. The final semantic barriers are unique in that they even act as barriers to 'shared understanding' even if no other barriers are in place and people would like to and know how to share knowledge. They refer to all the reasons why even perfect communication and knowledge exchange still leads to misunderstandings due to the stakeholders' different backgrounds, expertise, experiences, languages, and education.

In this paper we focus especially on the technology barriers and their impact on an organization's knowledge and data management as well as on collaborative work. Today, technology plays a major support role when using, sharing, saving and retrieving data to support an organization's internal processes and tasks and has the potential to increase quality while reducing required resources and time. Achieving this on a global, aligned, personalized, effective and efficient level is one of organizations' great challenges [23–25].

The following overview depicts today's state-of-the-art tool-landscape in many organizations. The list covers findings from Hessenkämper & Steffen in 2014, Steffen (2016) and Steffen et al. (2016) [6, 26, 27]:

- Localized and organization if not employee-wide distributed data storage,
- Incompatible tools with separate data handling (e.g., ERP, CRM and CMS systems),
- Missing integration and process support,
- Excessive use of inadequate communication media like E-mails, chats and calls and
- Incoherent document and data handling via tools like, e.g., PowerPoint, Word and Excel.

This situation hinders if not excludes an adequate alignment of
- Interdisciplinary work and communication
- Gathered data and knowledge, and
- Organizational processes across tools and platforms

In the data-driven world of today, this increasingly impairs the usability of the overall technical infrastructure and essentially affects the entire business of an organization: the missing alignment has to be compensated by the employees which slows down productivity.

Thus, the potential for the improvement of knowledge management, internal process support and business modeling is high. For now, everyone just tries to make the best of it and gets the projects/products finished on time. This short-term pressures and focus are

quite successful in the here and now, but in the long-term organizations need to make a major leap to compete with potential entrants which are not held back by these legacy structures.

3 Case Study GDPR

In this Section we will discuss today's approach towards solving external changes along the example of the General Data Protection Regulation (GDPR) introduction. The typical corresponding state-of-the-art sketched in Sect. 3.1 will be challenged by Why questions in Sect. 3.2 which is followed by a proposal for a more fundamental solution in Sect. 3.3.

3.1 Typical GDPR Solutions in Practice

GDPR aims to protect a person's personal data which covers all information addressing an identified or identifiable real and living person directly via their name, date of birth and address, or indirectly via e.g., telephone number, social security number and IP address or cookies [28]. Although the introduction, deadline and implications of the GDPR guidelines were clear for years many organizations just engaged in a final sprint in April and May of 2018 to meet the deadline. The remaining short time frame typically led to rather non-invasive bureaucratic add-on solution approaches.

According to GDPR, it is the organization's task to protect all personal data of employees, customers, suppliers and collaboration partners. Organizations are obliged to define a data protection officer who is responsible for ensuring that the organization obeys to the rules, educates the management and employees and defines internal data protection guidelines, processes and responsibilities.

Here, organizations must ensure that personal data processing is [28]:
- lawful, fair and transparent in relation to the data subject
- only collected for specified, explicit and legitimate purposes
- minimized to the adequate, relevant and limited time and purpose
- accurate and, where necessary, kept up to date and erased without delay
- limited to the necessary purposes for which the personal data are processed
- appropriately securing the personal data ensuring integrity and confidentiality.

Given the description of today's state-ot-the-art of IT landscapes in Sect. 2.2., it becomes obvious why the GDPR integration is a major challenge for most organizations:

1) How can organizations identify where personal data got used and saved? Given the legacy of the last centuries organizations built a siloed IT landscape in which many employees work on and safe documents locally. So, the data owners are not centralized but rather decentralized as every employee potentially saves documents containing personal data.
2) How to ensure that only people/employees with access rights have access to the personal data? This is difficult to achieve as normally complete documents like PowerPoint presentations and complex Excel tables get distributed via E-mail or

central storage spaces. In the past no one had to personalize these views and ensure that personal data gets protected. Thus, personal data is highly distributed and exists in all versions of the corresponding documentation.

3) How to ensure that personal data can be deleted on demand? As data is saved locally all employees who potentially processed the personal data in questions need to search all their (corresponding) documents for the personal data and delete it following the detailed instructions of the data protection officer.

Given the isolated and incompatible tool landscape and the distributed data handling on notebooks and phones organizations do not have much choice but to delegate the GDPR handling to the employees. They are the ones having access to and storing the data (locally) and thus must be the ones deleting it.

To delegate and inform the employees/data owners about the GDPR challenge the management/data protection officer tend to design PowerPoint presentations instructing the employees about their personal GDPR responsibilities. These presentations are distributed per E-mail to all employees (and hopefully read and not perceived as spam). From here onwards the employees must obey to the general guidelines and find and delete all personal data when requested.

This is how the *solution* will look like in practice:

1) The organization receives a request from e.g., a customer's employee to delete all of his/her personal data.
2) This request gets forwarded to the data protection officer.
3) The data protection officer must check which IT systems and employees might have had access to this particular personal data and have stored them in their 'shadow IT'.
4) Then the data protection officer contacts the IT administrators and relevant employees e.g., via E-mail with the request to delete this specific personal information in all documents (e.g., including all versions of a specific document). This requires that all triggered employees must search the globally and locally shared documents and E-mails for this personal information and delete it manually.

Unfortunately, this process cannot ensure that all relevant personal data is found and deleted. Thus, organizations typically plead for their best effort and deal with missing deletion when they are detected. Looking at recent fines, it is more than questionable whether current best effort will be considered sufficient in the future. However, whatever will happen in the future, the result of this traditional approach is:

> *Almost any device and any document of any employee*
> *has to be searched for personal data.*

This is unrealistic and has no chance for completeness: some to be erased personal data will inevitably remain undetected. The next section therefore questions this state-of-the-art in a Why fashion.

3.2 *Why*-Based Quality Analysis

In this section we question the result of Sect. 3.1 *"Almost any device and any document of any employee has to be searched for personal data"* by repeatedly asking *Why* questions.

Root-Why: It must be possible to identify and erase *all* personal data of individual persons *everywhere* on request.

We will concentrate here on the problem of identifying all locations where such information is stored. Our solution proposal (Sect. 4) also deals with the adequate erasing of information.

The importance of this *Why* can be confirmed by just one more *Why* question:

Why: GDPR demands to satisfy such requests.

Thus, we can consider the Root-Why as given. But does this really justify that *"Almost any device and any document of any employee has to be searched for personal data"*?

In the traditional setting this is again confirmed via a chain of *Why* questions:

Why: The personal data cannot be found otherwise.

> *Why*: Data are transferred as PDFs, text files, PowerPoint presentations and Excel documents via broadcast E-mails to the team members and/or other targeted groups. These are often processed *locally* for the simplified use/ editing.
>
> > *Why*: The different used systems have their own *local* data management (Outlook, Excel, Atlassian, ERP, etc.) and the involved users need to be able to access this data.
> >
> > > *Why*: Due to today's traditional *localized* IT infrastructure setup (cf. Sect. 2.2).

A better solution must therefore break this chain of argumentation. But how can this be achieved? Investigating the explaining *Why* chain one characteristic appears to be common to all levels: *locality*! In the next subsection we will sketch how a centralized solution may overcome all the mentioned problems in an elegant and efficient way.

3.3 *Why*-Based Solution Proposal

In this section we sketch how a centralized solution naturally solving all the aforementioned problems can look like. In fact, we argue that this solution has major positive side-effects also on other, apparently unrelated issues which will then also get better addressed and dealt with.

As revealed by the *Why* analysis in Sect. 3.2, *centralization* addressing today's issue of locality is the key towards overcoming the discussed problems. But what does this mean precisely? In essence it means that every source of data has a *single source of truth*, i.e., a single location where it is stored, and that all locally kept data automatically adjust

to this single source[1]. Illustrative examples for this principle are cloud-based solutions like Dropbox, Google Docs, and similar solutions to collaborative work [29–31].

In addition, the treatment of GDPR requires an adequately modularized and relation-based data management in a fashion that connections between data are explicitly modelled in ontological relations see Fig. 1. E.g., a person's record (i.e., information that just concerns this very person) is related to all relevant other data sources, e.g., via an address relation to the contact information or a health relation to the health records, etc. With such a data organization, erasing the data corresponding to a person just means to erase the relational connections to the record.
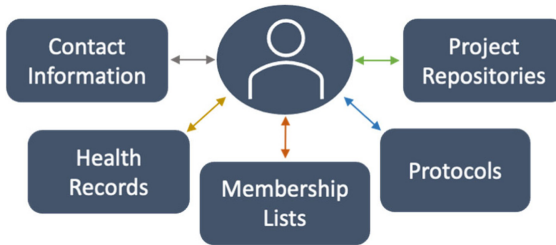

Fig. 1. Relational modeling of personal data

The benefit of this relational data organization seems marginal in the mentioned examples, as one could alternatively simply put all this information into the corresponding person record. This is, however, no longer true for data sources that concern many persons like membership lists, protocols and project repositories.

Please note that the described centralization approach provides many more benefits. Being able to dis-associate a person from some (data) resources is vital, e.g., when a person leaves an organization. Based on our observations many organizations would give a lot for a data management that is guaranteed to be consistent, let alone for a knowledge management which allows one to seamlessly address all data (of course in a secure, role-based fashion) in an aggregated form as illustrated in Fig. 2. This vision is quite straightforwardly realized on an adequately centralized data organization. And there are many more benefits, in particular concerning the inter-departmental exchange.

Admittedly, achieving such a data organization and management requires major reconstruction, is very expensive, and may take quite some time. Think of the impact such a change (digital transformation, cf. Fig. 3) would have on prominent ERP, SCM, HR, and supply chain solutions which essentially all base on a local data management (typically, every application requests the control over the data!).

Thus, a movement towards centralization imposes a major threat to many of today's IT solution providers which will fight for keeping as many data as possible, as it is the data that makes organizations dependent on these providers. The adaptation to the centralization approach, despite its numerous advantages, will therefore hardly be realized

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[1] This does, of course, not exclude replications of data for technical purposes like e.g., backups.
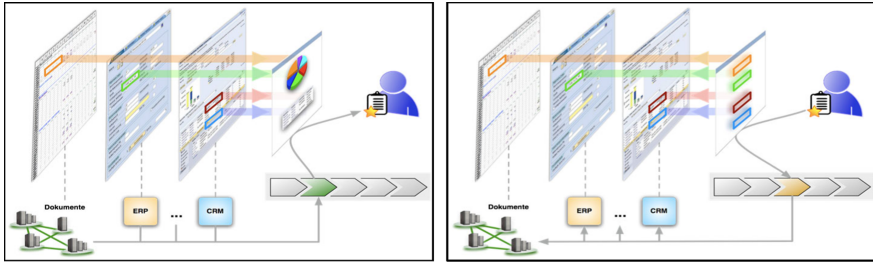
Fig. 2. Central data storage with personalized view and processing
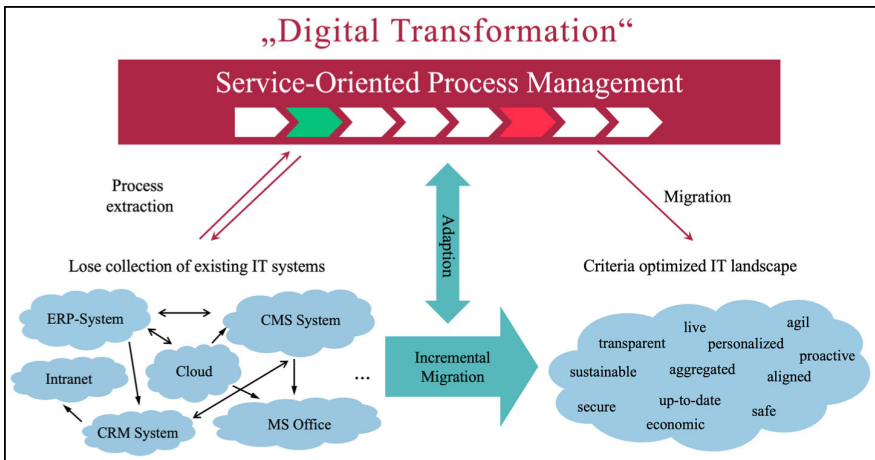

Fig. 3. Digital transformation from decentralized solutions to a global solution

in the near future for larger organizations. On the other hand, it is a great opportunity for smaller organizations which, this way, will gain quite a significant competitive advantage.

4 *Why*-Based Alignment

In this Section we reflect on the paper's observations from a more general perspective. To evaluate the decisions made in a top-down fashion from the requirements to the implementation we questioned them in a 'bottom-up' fashion (cf. Fig. 4). Looking at the proposed solution for an implementation we have asked ourselves, now in a bottom-up fashion, whether and why this proposal is (in)adequate, and whether there are alternatives and at which price. We have observed that the state-of-the-art IT-infrastructure of a typical organization is in the way to obtain natural and efficient solutions to the GDPR problem which can be solved much more elegantly and efficiently when changing from the today very localized data management to a centralized data or even better knowledge management.

Naturally, projects take part somewhere in the middle of an organization's hierarchy. E.g., a middle manager gets the task to implement an application for broadcasting (large) PowerPoint presentations to specific user groups. Now he has two options:

She could directly start applying traditional *How*-reasoning in order to e.g., implement an application that selects and then fetches the requested PowerPoint presentations from the file system, compresses them into a zip-folder, and then sends this folder to the addressees. Alternatively, the manager could also question the "what" by asking, e.g.,

> "*Why shall I implement this application?*".

And on the response

> "*We need to inform our employees about strategically important developments and regulations, e.g., concerning GDPR.*"

she could continue with

> "*Why should all employees store these documents locally on their notebooks?*"

and perhaps mention that this causes consistency problems (do all the employees really read the up-to-date version?), privacy problems (there is no control of document distribution), and lost control (did the employees look at the document at all?).

Just asking two simple *Why* questions reveals that an application based on a central document repository that provides read access to the involved employees and, ideally, a confirmation feature via a simply click at the end of the presented documents would be a much better solution.

More generally, asking *Why* is a good way of alignment: it helps to identify the relevant context, to get the affected stakeholders aboard, and to develop solutions that are accepted because they were commonly designed and fit the addressed need.
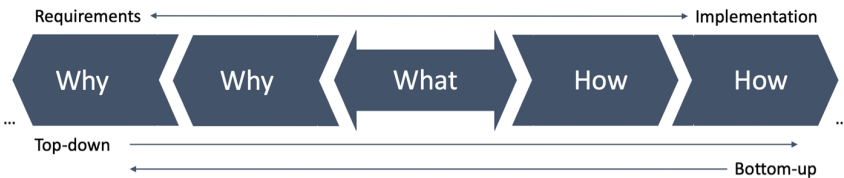

Fig. 4. Bottom-up analysis of top-down decision-making

This down and up reminds of the V-Model in software engineering, where the top-down requirement phase from desired concepts to implementation is complemented by a bottom-up integration and validation phase that provides the envisioned running systems. In fact, our *Why* approach has structurally a lot in common with the V-Model-based, plan-driven thinking, even though it does not aim at the realization of systems, but at a better (more global) understanding of the corresponding decision process and its frame conditions. Like for good system design, achieving a better global understanding typically requires feedback cycles, a fact, that led to numerous refinements of the originally hierarchical V-Model-based approaches. The One-Thing Approach (OTA) can be

regarded as such a refinement: It is conceptually hierarchical, but allows to re-enter the process at any time, however at dedicated task-specific positions only, and in a way that avoids cyclic dependency propagation in order to guarantee global consistency [32]. Handling feedback cycles in the OTA fashion is also a good means for a goal oriented, consistent *Why* handling.

It often turns out that high hurdles at the implementation level can often be overcome by stepping back and altering the frame conditions. The GDPR example with its proposed change from local to global knowledge management is an extreme case: both the measure (re-structuring of the data management) and the impact are extremely high. Popular other examples can be observed in DevOps scenarios. In fact, the advantages gained by DevOps can be regarded as being the result of a *Why*-based analysis: Having an operations expert aboard allows one to adjust the early design in a way such that the step towards operations has no unnecessary hurdles [33]. Or, more concretely, the operations expert can ask the *Why* question whenever she observes a pattern that may cause problems in the later lifecycle. In fact, the GDPR example of a data elimination request also requires a treatment which strongly profits from a tight cooperation between development and operations.

In this light, the *Why* approach is nothing but a means to globalize the decision space in order to find better solutions. This globalization can be extremely powerful, in particular in cases, where the envisioned solutions are part of a bigger picture. Today's practice focusses far too much on local optima rather than considering what needs to be achieved globally. Asking *Why* is a good practice in these cases to overcome the so-called 'silo mentality' of individual cases by connecting and aligning them globally.

5 Conclusion

In this paper we sketched the current economic situation which is under pressure due to the increasing IT influence. Organizations need to change, to either achieve a leading edge or to prohibit that other organizations overtake their market leadership. We have also argued that established organizations have problems to take this challenge up, and that they typically hardly touch the opportunities offered by today's IT systems. Even radical contextual changes like, e.g., the ones imposed by the GDPR regulations, do not seem enough to act as a wake-up call. Rather, they are answered with traditional means that, in the long-term, are economically disastrous, imposing a lot of manual work and, as in the GDPR case, may lead to high penalties.

We have discussed the reasons for this status quo which seems, in particular, to be the result of a too local and short-term thinking: Even the necessity of global searches for personal data across an entire organization for satisfying certain GDRP regulations do not seem to suffice to question the status quo.

We have illustrated how simple *Why* questions may lead to simple answers. In case of GDPR, the local and distributed data management can be regarded as a root problem prohibiting efficient solutions: a centralized knowledge/data management with an adequately modeled data space, e.g., relational, in terms of ontologies, would essentially trivialize the system-wide search for all personal data.

Admittedly, this insight alone is not a solution, and applying it to large organizations is a major challenge. Thus, we envision that insights like this will be taken up first by smaller organizations which may then grow due to their competitive advantage.

That solutions to presumably very difficult problems may become commodity is, in fact, not too rare. A prominent example is enterprise-wide communication: Being able to offer a global communication system to an organization was still a vision in the eighties but is now almost for free due to the Internet. Today, clouds ease the centralization of knowledge. We are therefore convinced that the described changes will happen, and that early adopters will be the winners of this development.

Progress is often achieved because somebody asked a *Why* question. In our eyes this happens far too seldom. At least whenever something seems unreasonable one should automatically ask "*Why* can this be?". This (critical) reflection is the way to progress and innovation. Unfortunately, the many regulations we are confronted with are rarely well explained, a fact that makes us lazy, and surely, we cannot question everything. We should, however, question the seemingly unreasonable in our area of expertise.

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