Supporting Active and Healthy Aging - An Assistive Process Improvement Approach

Gerhard Chroust
Johannes Kepler University Linz
Email: gerhard.chroust@jku.at
Georg Aumayr
Johanniter Oesterreich Ausbildung und Forschung gemeinnuetzige GmbH
Email: georg.aumayr@johanniter.at

***Abstract*—Active and Healthy Aging (AHA) is one of the growing concerns and aims of a sustainable society and of the European Union. In many business and industrial enterprises, the adoption of a process view and the analysis of the processes to be performed has brought about numerous advantages, ranging from clarity and understandability to increased efficiency due to assessment and measurements of quality and capability. In this paper, we apply the process view concepts to the processes needed for Assisted Healthy Aging. The necessary activities are described on an abstract level (i.e., as activity types) and organized in a Process Model. Individual processes are derived (instantiated) from the AHA-model to be enacted by the aging persons, the Seniors, utilizing the human and technical support structure. We discuss the application of the concept of process view in the AHA-environment, especially pointing out the difference from classical business/industrial processes. A discussion about the possibilities to assess the quality of AHA-processes and their support by a Model Interpreter closes the paper.**

***Keywords*–Seniors; Process View; Process management; Maturity; Capability; Assessment**

I. INTRODUCTION

Active and Healthy Aging (AHA) is one of the growing concerns and aims of a sustainable society and the central theme of the EU Project My-AHA [1]. Supporting Active and Healthy Aging is an ethical, an economic and finally also an organizational issue, especially due to the demographic changes in the Western World. Most Seniors will become involved in active and/or passive roles in activities related to AHA, if they like it or not. Usually, support is needed to compensate for lack of Seniors' sufficient capability to perform simple or complex necessary processes on one's own. This deficit in capability has to be overcome by a human support environment (consisting of persons from many different disciplines: family, doctors, nurses, service personal, helpers, etc.) and the technological support system (consisting of gadgets, tools, computers, robots, etc.). Automation will be a key factor in providing an effective and also economic support.

Based on the advantages and the success of the process view in industry ("Industry 4.0"), i.e., an increased autonomous intercommunication behavior of multiple machines, we suggest adopting a process view of supporting AHA. This will be a good basis for including technological means and tools. We believe that applying a process management approach can help to improve the quality, efficiency and understandability of AHA-projects. We will use the terminology and concepts of system development processes (e.g., ISO/IEC (International Organization for Standardization / International Electrotechnical Commission) 12207 [2] and ISO/IEC 15288 [3]) for describing the AHA-support processes, their interfaces and the necessary requirements. Quality assessment will be based on the ISO/IEC 33000 family of standards [4].

In this adoption process, we have to be aware that an obvious key difference is that the 'objects' of software processes are innate artefacts and not living beings, human Seniors. This will impose strong implications and limits with respect to aspects of humanity, morality, ethics, and risks.

The paper will be structured as follows: In Section II, we will describe the basic concepts and terminology of a process view, i.e., the structure of processes with activities and tasks and their interrelations and the Process Models. While this discussion is applicable essentially to all processes we will specifically discuss the requirements, challenges, and differences introduced by considerations of AHA, especially in comparison with 'pure' technical processes in Section III. In Section IV, we will again be inspired by software engineering with respect to discussing means to measure, control and even improve the quality of AHA-processes. At last, Section V will be devoted to the technological support to enact, assess, control, and measure the maturity of the AHA-processes leading to concepts for an AHA-Process Interpreter.

Statements and observations specific to AHA will be emphasized by printing them in italic and preceding them by "AHA:".

II. THE PROCESS VIEW

A. Activities and Tasks

The process view decomposes a complex undertaking into a set of processes, activities and tasks, which interact and exchange information and work products ("inputs" and "outputs"). The Software Engineering Standard ISO/IEC 12207:2017 [2] defines:

- process : set of interrelated or interacting activities that transforms inputs into outputs
- task : a requirement, recommendation, or permissible action, intended to contribute to the achievement of one

or more outcomes of a process. (In the management literature a task is often considered an uninterruptible unit of doing to be performed in one go.)

- activity : a set of cohesive tasks of a process. Despite the fact that the above distinctions are important for the structuring of Process Models, we will in most cases simply speak of 'activities', encompassing also tasks and sometimes also processes.

The division of an activity into different tasks (the granularity) will depend on the nature of a task and also on the capability/knowledge of the performing person [5][6]. A Process Model designer must strike a good balance between too coarse a granularity (leaving to much open and some users helpless) and too fine a granularity (boring some users with unnecessary and/or' obvious' details of tasks).

AHA: *This issue will receive special attention in this paper (see Section III). Activities can be assigned to be performed by the Senior himself/herself, by various helpers from different professions and machines (computers) of diverse capability and diversity. One consequence is that the same support activity task has to be divided differently depending on the capability of the individual Senior.*

B. What is a Process Model?

A Process Model defines and documents the activities, their contents, their meaning, and their interaction (input and output) with other activities. For Software Engineering, the key documents are ISO/IEC 12207 [2] and ISO/IEC 15288 [3].

The Process Model abstracts from idiosyncrasies of a single process and describes the process 'in general', independent of the enacting person or the object of the activity. It describes in an abstracted form all necessary activities (e.g., 'evaluate health status' or 'perform operation') and their logical dependencies (e.g., 'measure blood pressure' before 'perform operation') and the necessary work products (e.g., 'blood pressure values', 'description of previous treatments') to be produced and used by these activities. When modelling a process, all semantically equivalent activities are abstracted into one "activity type" [7], e.g., measuring blood pressure in the morning, the afternoon and the next day are abstracted to one activity type 'measure blood pressure' (Figure 1). Similarly, the work products are abstracted into "work product types", e.g., to a work product type "blood pressure".

The logical dependencies between activities are also expressed on the 'type'-level and have to be applied for the individual activities (instances). This leaves still considerable freedom to "navigate", i.e., to choose the next task [9], see Figure 2. A Process Model contains in abstracted form the experiences of many preceding processes combined with theoretical considerations and desirable improvements. By updating the Process Model, newer experiences and best practices can also be added to it. Different methods and strategies will distinguish themselves, both in the activities and work products, but especially in the sequence the various activities are to be performed in.

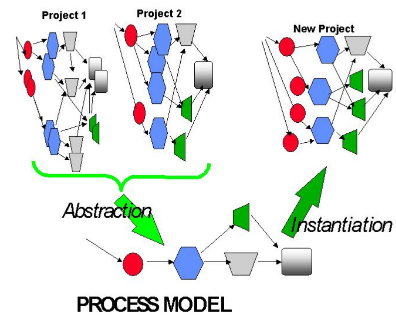

Figure 1. Process Abstraction and Instantiation [8].

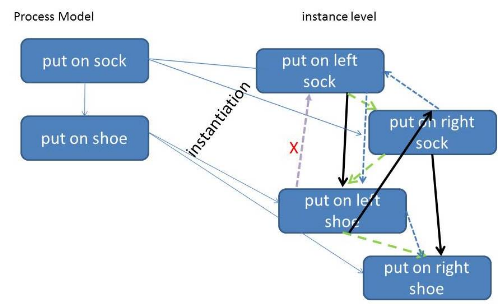

Figure 2. Instances of activity-types and work-product-types for AHA.

Figure 3 shows the extended meta-model of a software Process Model, also showing additional components: tools, roles, input/output relations, and structural information [9].

C. Advantages of the Process View

Key advantages of a formal Process Model are [9][10] :

- from implicit to explicit definition : A formally described Process Model can be recorded, standardized, transmitted to others, stored and taught, thus converting implicit knowledge into explicit knowledge [11].
- Storing Best Practices : It also acts as a repository for new best practices, thus preserving experience, but also allows audits and recording of inadequacies. One can also identify essential or usefully subprocess ex-post [6].
- Standardization : It provides standardization across different persons, projects and applications. This is of special value for the cooperation of heterogeneous teams.
- Quality assessment : The process can ex-post be evaluated, improved [12], its capability and maturity assessed (e.g., by the ISO/IEC 33000 family [4]. For details see Section IV.
- Audits, Tracing and Recording of Resources : Computer support allows the automatic recording of enacted activities and accounting of used resource (personnel, volunteers, operational material, etc.)
- Computer Support : A formally described Process Model can be supported by a Process Interpreter, see Section V.

 ISBN: 978-1-61208-565-4

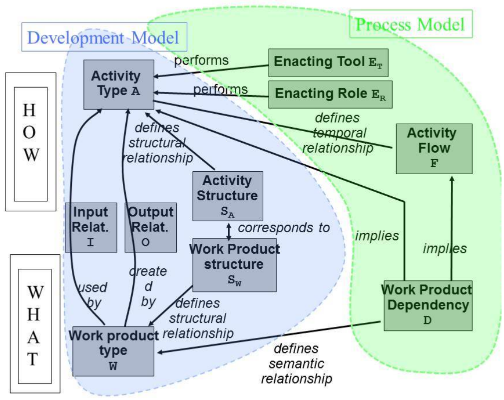

Figure 3. A Process meta-model.

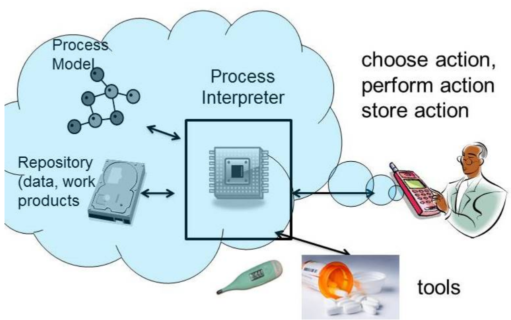

Figure 4. Interfaces for AHA.

D. Enacting a Process Model

When performing a project (or actually any activity based on the Process Model (Figure 3)) the model has to be 'enacted'. An appropriate 'Interpreter' of the Process Model (Figure 4), be it a human or a computer programs has numerous different activities to perform.

- Instantiation and administration of activity types : Instances of activity types must be created, shown to the user, worked on by the user, and their status remembered (planned, started, finished, under rework, etc.). Access to the needed inputs must be provided, outputs identified.
  AHA: *In many cases a Senior has to initiate and/or perform specific activities. The Process Interpreter can ask the Senior to do so. It is difficult to check whether the actions have been performed, see Section III-B.*
- Instantiation and administration of work products : All work products (documents or pointers to external artefacts) must be created (are 'replicated'), i.e., instantiated as often as necessary (Figure 2)), administered and related to the appropriate activities.
- Navigation : The enactment of an activity (an instance) must honour restrictions and dependencies within and between all other activities (e.g., sequence constraints between activities, common start or end of activities, exclusion of parallelism between them, etc.).
  The sequence in which activities are to be performed (the 'navigation information') is partially defined in the Process Model. The Model (as a construct on the 'type' level) leaves considerable freedom.
  AHA: *For example, a Process Model for a Senior might contain two activity types "put on socks" and "put on shoes" (see Figure 2). Actually, each of these two activity types identifies two activities (one for the right and one for the left foot) and thus would result in 8 different activity sequences.*
- Pre-emption and Resumption : Sometimes processes have to be urgently interrupted in order to assign resources to other activities, typically for emergencies.
  AHA: *An unexpected heavy bleeding has to be handled immediately, probably pre-empting another activity. After the emergency has been taken care of it is often difficult to decide how to handle the interrupted activity (start anew, continue at point of interrupt, abandon the rest of the activity). In all cases the Process Model Interpreter has to be informed and the necessary status set.*

III. SYSTEM DEVELOPMENT AND SUPPORTING AHA

In this section, we will expand on the use of the Process View in AHA and use the experience and know-how from Software Engineering. See also a similar comparison between Software Engineering and Disaster-Management in [13].

A. AHA as a Collection of Processes

The processes performed in AHA are in many aspects similar to systems engineering. A Senior himself/herself is a very complex system. The processes, which try to improve his/her status and/or situation must - as consequence - also be very complex, as the Law of Requisite Variety postulates [14]. Support for Seniors by humans and machines (including computers) must enact a large variety of support processes.

Health care processes diverge in their properties in several ways from the classical systems engineering processes. The reason lies in the different focus of these two types of processes: the 'objects' of AHA are living humans with their will, personality and idiosyncrasies while the objects of systems engineering processes are usually inert software objects. Humans are flexible, variable, sometime irrational, and provided with a free will, with moods and variations. This has to be considered when discussing the various components of the AHA-process. We restrict ourselves to My-AHA, i.e., supporting individuals in living through their aging process in an acceptable and healthy status.

All activities must be designed with strong consideration of human factors with respect to all involved persons [15][16]. This includes observation of cultural differences between ethnic groups [15] with respect to contents, form and differences as far as believing in and interpretation of warnings and instructions and the willingness to obey them [17].

 ISBN: 978-1-61208-565-4

B. Challenges in AHA

Considerable differences exist between the situation in a system engineering situation as compared to a AHA-situation (see also [13]) . Many of them challenge our creativity.

- Completion Control : In a 'regular' system development project guided by a Process Model each task or activity has at least one outcome in tangible form (a piece of document, finished intermediate product etc.), which is expected (and needed) by a successive task. In most cases a different person will be in charge of the successive task and therefore will 'ask for' the result - quality might be lacking, but a document is expected.
  AHA: *In most cases this is not true. Most 'outputs' of an AHA-process are triggers for another activity or acknowledgements ('take medicine XYZ' , 'morning gymnastics done', ...). In the Process Model only surrogates for these 'outputs' are created. Whether the Senior has cleaned his/her teeth, or drank enough liquid is very difficult to control. The simple solution that the Senior has to acknowledge the completion of the task is of little use since a Senior can (and often will) easily fake the acknowledgement.*
  Two approaches are promising:
  Internet of Things: Utilizing the concept of the Internet of Things one can equip essential gadgets (e.g., the tooth brush or the jug) with active sensors and thus recognize the completion of an activity (at least to a certain extent). However, experience also tells us, that many Seniors dislike this type of control and will be very creative in circumventing and faking completion (e.g., watering the flowers instead of drinking, etc.)
  Gamification: A more promising approach seems to be the concept of Gamification [18]: the recognized successful completion of an activity will produce of visible 'achievement mark' on a prominently visible display. Psychologically this is more promising, but can only be used in certain environments.
- Misplacing and Searching : In a Software Engineering Environment the Process Interpreter stores, administrates and makes available the work product.
  AHA: *Seniors are generally plagued by misplacing things and having problems finding them later. To a certain extent an Internet of Things approach could help, one would need to equip all important object with sensors. In this case the system could indicate where to find the necessary objects or documents*
- Forgetfulness : Depending on the specifics of the chosen Project Interpreter, users will be reminded of pending activities and deadlines
  AHA: *Seniors tend to become forgetful. A Process Interpreter can bridge and alleviate much of this forgetfulness by registering activities and dates to remind the Senior.*
- Time variability : While mechanical systems show a reasonable predictability and stability this is not true especially of Seniors.
  AHA: *This means that one cannot make reliable assumptions about the physical or mental status of a Senior. It can change any time. Therefor the AHA-processes must be carefully double checking the situation etc.*
- Lack of full knowledge of the history : In Software Engineering lots of the information is not provided explicitly but hidden in the code and documentation (as far as trustworthy).
  AHA: *Similarly historical data documented about a Senior is full of hidden facts, omissions, mistakes, misunderstanding and unknowns - often due to privacy considerations. Treatment has to take this into account, especially if certain activities are performed by computers.*
- Pre-emption of activities : One often has to interrupt an activity in favour of performing another one.
  AHA: *A well-ordered enactment of a Process Model is often not possible. Activities have to be started suddenly due to an emergency (e.g., "severe coughs"). Other activities have to be interrupted and later taken up at the point of interrupt, or repeated.*
- Pressure of Time and Success : The production of software seems to be notoriously under performance pressure.
  AHA: *For Seniors the time very often 'runs away'. Hazards appear suddenly and have to be taken care of immediately. Life-saving activities often have a very narrow time window to be successful.*
- Stress and psychological pressure : Helpers are often under stress due to the responsibility in view of unclear situations [19][20].
  AHA: *This problem often is more pronounced due to the close relations between Seniors and personnel.*
- Systemic problems : Health problems are usually the result of several interacting causes.
  AHA: *Illnesses and hazards often have highly interrelated causes and reciprocal influences, often showing new symptoms (emergence [21]) like allergic reactions against some medicine. Domino-effects of existing illnesses, side effects of medication need to be considered*
- Cultural "blockages" and taboos : When treating Seniors, social taboos and conventions have to be kept in mind (no blood transfusion for Jehovah's Witnesses, no male personal for Muslim women, etc.).
  AHA: *Seniors often have their own mind, long established peculiarities and often no understanding for the necessities of treatment. They also often object to being 'led' by a 'machine' despite the lack the capability to manage themselves.*

IV. Capability assessment of the AHA-processes

One of the key advantages of defining and following a Process Model is the possibility to assess the capability of the performing organization: to what extent can the organization provide the services and products intended to be provided based on a standardized and accepted Process Model (cf. [4])?

In the 1980s, the Software Process Program was founded at the Software Engineering Institute (SEI) at Carnegie Mellon

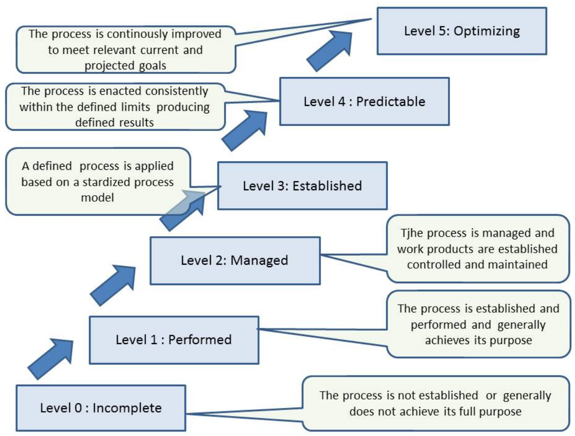

Figure 5. Levels of Process Capability (ISO/IEC 33000 [4]).

University under the leadership of Watts Humphrey. This program resulted in the development of the Capability Maturity Model [22][23][24]. A prerequisite is a comprehensive, generally agreed-upon Process Model containing all the key processes needed for software engineering. [2] identifies some 40 individual processes. These processes are rather comprehensive with many individual tasks. Each process is evaluated to what extent it is performed by the organization (N..not performed, P..partially performed, L..largely performed, F..fully performed). This yields a profile as shown in Figure 6. This profile can be compared to other Process Models, to an industry average and also compared with the profile needed for the specific project.

AHA: *A Senior who is able to walk alone, does not need certain processes irrespective of their performance level.*

In order to characterise a complete enterprise (be it a software house or - in our case - a senior home) its overall maturity is of high relevance for future planning and can be measured. Figure 5 is the basis for assessing an enterprise. In software engineering the levels (see Figure 5) run from incomplete (where the process is mostly unsuccessful) up to 'improving' (where the process is continually adapted to new needs and challenges). In a nutshell the maturity of an enterprise to produce good software can be assessed and measured using a two dimensional graph (capability versus individual relevant processes), see Figure 6. The Assessment can also be used for the improvement of the processes [10][12].

AHA: *One needs a comprehensive, agreed-upon Project Model and historical records of what has worked in the past. Then one can identify deficiencies in the Process Model, compatibilities and differences of various processes (since not all Seniors need all processes), and identify the improvement potential.*

V. A Process Interpreter

Computer support is the key for efficiency and effectiveness of the AHA-processes. It has to show two different faces:

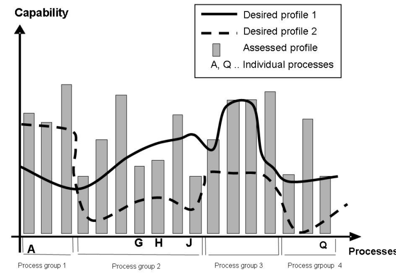

Figure 6. Comparing different profiles.

One is directed to the Senior, the aging person. It has to be empathic, helpful and tries to explain/show the situation in a way a Senior can understand. The other one is technological and effective and provides a stable, effective infrastructure for the other interface.

A. User Interface

The system helps the user to enact the processes he/she is supposed or intended to perform. It also allows the user enter processes of his/her own (things to do, things not to forget and be reminded, deadlines...) Considering the challenges listed in Section III-B a Process Interpreter for AHA-purposes must fulfil several somewhat contradicting properties:

- strict : Certain activities must be performed exactly as prescribed, often even within a very narrow time window.
- tolerant/flexible : Some activities may be performed not at all or very loosely, depending on the specific situation, especially in view of the varying psychical and mental situation of a Senior.
- robust : The system must be robust against disturbances of various kinds (be it changes in the well-being of the Senior, computer failures, cultural differences, sudden unexpected changes in the behavior or the situation, ...)
- agile : Handling of Seniors must be highly flexible (especially due to inflexibilities, which come with old age.)
- user-friendly : The interfaces must be easy to understand and show "good behavior with the sensitivity of an intuitive, courteous butler" [25]. They should take into account the personal and cultural differences as defined in [26]
- unobtrusive and non-stigmatic : The Senior must feel confident, that his/her use of the assisting system is accepted by his/her peers and neighbours without negative feelings.

B. The Role of Tools, Machines and Robots

In many ways, robots can even replace humans. For this to happen, it is necessary to have a clear, unambiguous and formal

 ISBN: 978-1-61208-565-4

description of the processes to be performed (the Process Model), plus a characteristic of machine environments. Thus it is possible to allocate processes to persons or machine, whatever is the better choice, also for the Senior. Robots can relieve helpers from chores, which do not really require human understanding and human empathy versus the Seniors. A Process Interpreter (Figure 3) is an ideal tool and infrastructure to automatically include the access to tools into the AHA-processes.

VI. Conclusion and Future Work

Adopting a process view for supporting Assisted Healthy Aging (AHA), like in other business and industrial areas, promises an improvement in clarity, understanding, and efficiency: The necessary processes are defined and documented in a Process Model, which is the basis for automatically guiding the execution of the individual processes by a so-called Process Interpreter. It helps all stakeholders, Seniors, human support personnel to follow the processes and use technical support. This approach also allows a better control of the execution of these processes and assess the quality and capability of the defined processes. Implementing such a scenario requires a deep understanding of the behavior, the limitations and idiosyncrasies of Seniors.

Obviously, the work described here is only a beginning. More work has to be done to understand the requirements of Seniors with different social, cultural and economic background. This strongly affects the 'look and feel' of interfaces, especially with respect to ease of use and empathy. We hope that our contribution will trigger further research and useful result for Assisted Healthy Aging of Seniors.

Acknowledgment

This the research behind this paper was supported by the EU Horizon-2020 project No 689592 My-AHA: all /stadarMy Active and Healthy Aging, 2016-2019.

References

[1] Univ. Torino(ed.), "My-aha - my active and healthy ageing," http://www.activeageing.unito.it/home, [retrieved: May, 2017], 2016.

[2] ISO/IEC, "ISO/IEC cd 12207.4 Systems and Software engineering - Software life cycle processes," Internat. Org. for Standarization, ISO, Tech. Rep., 2016.

[3] ——, "ISO/IEC 15288:2006: Systems Engineering - System Life Cycle Processes," Internat. Org. for Standarization, ISO/IEC JTC 1/SC 7/WG 7 (Jan 2006), Tech. Rep., 2006.

[4] ——, "ISO/IEC 33001:2015 : Information technology – process assessment – concepts and terminology," International Organisation for Standarization, Tech. Rep., 2015.

[5] F. Milani, M. Dumas, R. Matulevicius, N. Ahmed, and S. Kasela, "Criteria and heuristics for business process model decomposition," Bus Inf Syst Eng, vol. 58 (2016), no. 1, 2016, pp. 1–17.

[6] W. van der Alst and S. Dustdar, "Process mining put into context," IEEE Internet Computing, March 2012, pp. 82–87.

[7] G. Chroust and G. Aumayr, "Process models for disaster management - standardization and assessment," in EMCSR 2014 - book of Abstracts, W. Hofkirchner and S. Blachfellner, Eds. BCSSS 2014, p. 5.

[8] G. Chroust, N. Sturm, M. Roth, and P. Ziehesberger, "Regional disasters and systemic reactions," in ISSS 2011 and ISKSS 2011: All Together Now: Working across Disciplines, J. Wilby, Ed. (CDROM) Int. Systems Science Society, UK, 2011, p. 15 (paper no 1631).

[9] G. Chroust, "Software process models: Structure and challenges," in Feng, Y. and Notkin, D. and Gaudel, M.C.(ed.): Software: Theory and Practice - Proceedings, IFIP Congress 2000, Aug. 2000, Beijing. Kluwer, 2000, pp. 279–286.

[10] SPIRE Project Team, The SPIRE Handbook - Better, Faster, Cheaper - Software Development in Small Organisations. Centre of Software Engineering Ltd, Dublin 9, Ireland, 1998.

[11] I. Nonaka and H. Takeuchi, The Knowledge Creating Company. Oxford University Press, New York 1995.

[12] W. van der Alst, M. La Rosa, and F. M. Santoro, "Business process management - don't forget to improve the process!" Bus Inf Syst Eng, vol 58 (2016), no. 1, 2016, pp. 1–6.

[13] G. Chroust, G. Aumayr, G. Haider, R. Randus, and A. Thür, "Prozessmanagement im Katastropheneinsatz: agil, strikt, tolerant und robust? (Process management in disaster management: agile, strict, tolerant and robust?)," in Projektmanagement und Vorgehensmodelle 2016 - Arbeiten in hybriden Projekten: Das Sowohl-als-auch von Stabilität und Dynamik, M. Engstler, M. Fazal-Baqaie, E. Hanser, O. Linssen, M. Mikusz, and A. Volland, Eds. Lecture Notes in Informatics (LNI), vol P-263, Gesellschaft für Informatik, Bonn 2016, pp. 93–107.

[14] W. Ashby, "Requisite variety and its implications for the control of complex systems," Cybernetica 1:2, p. 83-99. (available at http://pcp.vub.ac.be/Books/AshbyReqVar.pdf) [retrieved: May 2017], 1958, pp. 83–99.

[15] D. McEntire, Disaster Response and Recovery: Strategies and Tactics for Resilience. Wiley, USA 2007.

[16] ISO, "ISO 22320:2011, Societal security – emergency management – requirements for incident response," International Organization for Standardization, 2011, Tech. Rep., 2011.

[17] K. Haddow and G. Haddow, Disaster Communications in a Changing Media World. Butterworth-Heinemann Homeland Security, kindle-book, 2008.

[18] S. Deterding, D. D., R. Khaled, and L. Nacke, "From game design elements to gamefulness: defining gamification," in Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments. ACM 2011, pp. 9–15.

[19] D. Duckworth, "Psychological problems arising from disaster work," Stress Medicine vol. 2 (1986), no. 4, 1986, pp. 315–323.

[20] Bundesamt f. Bevölkerungsschutz und Katastrophenhilfe, Psychosoziales Krisenmanagement in CBRN-Lagen / Psychosocial Crisis Management in CBRN Incidents. Bundesamt f. Bevölkerungsschutz und Katastrophenhilfe, Germany 2011.

[21] G. Chroust, "Feature interaction and emergent properties," in Feature Interactions: The Next Generation (Dagstuhl Seminar 14281), S. Sven Apel, J. M. Atlee, L. Baresi, and P. Zave, Eds. Dagstuhl Reports, vol. 4 (2014), no. 7, Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2014, pp. 15–16.

[22] W. Humphrey, Managing the Software Process. Addison-Wesley Reading Mass. 1989.

[23] ——, "A discipline for software engineering," SEI Series in SW Engineering, Addison Wesley, 1995.

[24] H. van Loon, Process Assessment and ISO/IEC 15504. Springer, New Aork 2004.

[25] C. Miller, Ed., Human-Computer Etiquette: Managing Expectations with Intentional Agents. Comm. ACM vol. 47 (2004), No. 4, 2004.

[26] G. Hofstede, G. J. Hofstede, and M. Minkov, Cultures and Organizations - Software of the Mind, 3rd edition. McGraw-Hill, NY 2010.