

ACTION, DESIGN & RESEARCH – A LOGICAL DATA MODEL

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Research paper

Abstract

Developing Action and Design Research (ADR) interventions involves the application of a rigorous set of processes, and the production of explicit data to support the whole process, evidencing its base, intermediate, and final results.

In a previous publication – based on empirical work, a comprehensive literature review, and the practice of its application teaching graduate students on qualitative research – a conceptual model for ADR has been developed. It has presented a tri-dimensional perspective, emergent from the Organization Development, Engineering and Science approaches, identifying its core processes and data.

Based on that view, a high-level Process Meta-Model has been produced, detailing the main processes involved in ADR interventions and the associated data flows.

Progressing within this structured line of research, the objective of this publication is to present a pragmatic approach to ADR main data structures – under the form of a high-level Data Model – evidencing the core data involved in the design, planning, development, and evaluation of this kind of initiatives.

It includes the associated data structure diagram and the relevant details of the respective data components, which will act as researchers' facilitators for documenting the whole process.

Keywords: Organizational Research, Action Research, Design Science Research, Data model.

1 Introduction

Action Research (AR) and Design Science Research (DSR) have already proven to be effective approaches to promote organization development and to design innovative artifacts, solving contextualized problems and generating actionable knowledge. Several important seminal and structural publications (as summarized in Henriques & O'Neill, 2018B) have affirmed this multiplicity of approaches, either for Action Research as well as for Design Science Research. They are, indeed, robust knowledge landmark references on the field which provide strong orientations for Action and Design Researchers. Also, from a science perspective – starting from a knowledge gap/problem/opportunity and developing research activities to explore them – several publications provide multiple perspectives concerning the necessary rigor for its main processes and associated data collection, analysis, and presentation.

1.1 Research meaning and directions – antecedents

This publication is an integrated part of a wider research program – focused on the study, development, and application of Action, Design, and Research-based approaches. It aggregates knowledge emerging from previous empirical studies and systematic literature reviews, used to teach graduate students, and, progressively, to develop conceptual and logical meta-models, designed to be applied and tested along graduate students' thesis and dissertations, as well as in real organizational projects.

The current line of research – globally focused on the need for having simple, clear, and pragmatic models to approach Action and Design Research (ADR), to be used to teach and to act on thesis and dissertations advising – has already produced several main pieces of research outcomes.

Globally, these previous publications act as main foundations for the current research, particularly through its deep literature review focused on its main process and data.

It has include some most relevant publications concerning the Action dimension (Shani & Pasmore, 1982; Susman & Evered, 1978; Kemmis & McTaggart, 1988; Coghlan & Brannick, 2010), the Design dimension (Peffer et al., 2008; Reeves, 2006; Hevner et al, 2004; Hevner, 2007; Offerman et al., 2009; Vaishnavi & Kuechler, 2015; Hevner & Chatterjee, 2010; Gregor & Hevner, 2013) and the Research dimension (Saunders, Lewis & Thornhill, 2009; Yin, 2009; Bryman, 2012; Eriksson & Kovalainen, 2008; Creswell, 1994) –focused on its main process and data.

1.2 Research targets: problem, objectives and research questions

Following a line of continuity with the previously developed research work, the current publication intends to address the main problem of structuring the main pieces of data evidence involved in ADR initiatives, to act as a global orientation to facilitate the researchers' task on documenting the whole process. In line with this problem-area, it addresses three essential research questions, namely:

- What are the main data groups that must be considered in a logical model concerning the information used along ADR initiatives?
- What are the main relationships between these data groups?
- What are their main data components?

According to this, the main objective of this research is to develop an ADR data model (data structure, data groups and data components) to assist the ADR researcher and practitioner on the fulfilment of the associated documentation requirements. It covers all the ADR stages, namely: pre-proposal, proposal, planning and design, implementation and evaluation, and publication.

1.3 Research approach

To reach this global objective, answering to the research questions in order to solve the identified problems, the current research has followed a DSR approach. It has focused on the essential aspects to be covered during the DSR process which – as prescribed by Hevner (2007) – include its requirements, grounding, artifacts, field testing, evaluation, and knowledge generation.

2 Groundings on previous research works and literature review

As mentioned, the current research work is an integrated part of a wider research – globally focused on the need for simple, clear, and pragmatic views and models to approach ADR, to be used in teaching, dissertation advising, and real organizational field applications. So, the main outcomes from previous author's published research – including deep literature reviews and research findings – act as main foundations for the current research. The need for such kind of conceptual views and meta-models was initially addressed, within a doctoral dissertation (Henriques, 2015), in order to respond to a specific need for having a clear understanding of the main processes and data involved in an Action Research real application to a specific transformational change program (Henriques & O'Neill, 2014).

Subsequently, at a logical level, a process meta-model targeting holistic and participatory Action Research initiatives within organizational settings has been developed and published (Henriques & O'Neill, 2018A). It has reflected the initial process which has been applied, being further tested and didactically enriched by the feedback emerging from DBA and Information Systems and Management MSC students' teaching on qualitative research methods.

Further on – increasing the models' level of scope and abstraction, grounded on empirical research work and on systematic literature reviews, and focused on the Action Research (AR) and Design Science Research (DSR) paradigmatic approaches – a conceptual model for ADR has been developed. Using the DSR approach, it has provided a general view (Henriques & O'Neill, 2018B) of the associated process, data, and relationships, thus responding to relevant self-reflecting questions, namely:

- “What are the essential steps of the research process which will allow me to introduce rigor on my knowledge-generation practice, and what are the pieces of information that must be used and produced at each step?”
- What are the essential steps of the design process which allow me to introduce relevance on my engineering practice, progressing from problems to artifacts, and what are the pieces of information that must be used and produced at each step?
- What are the essential steps of the change process which allow me to effectively advance on my organization development practice, and what are the pieces of information that must be used and produced at each step?”

In order to provide an answer to those essential questions it has been developed a pragmatic overview (figure 1) of the essential data and processes necessary to solve it.

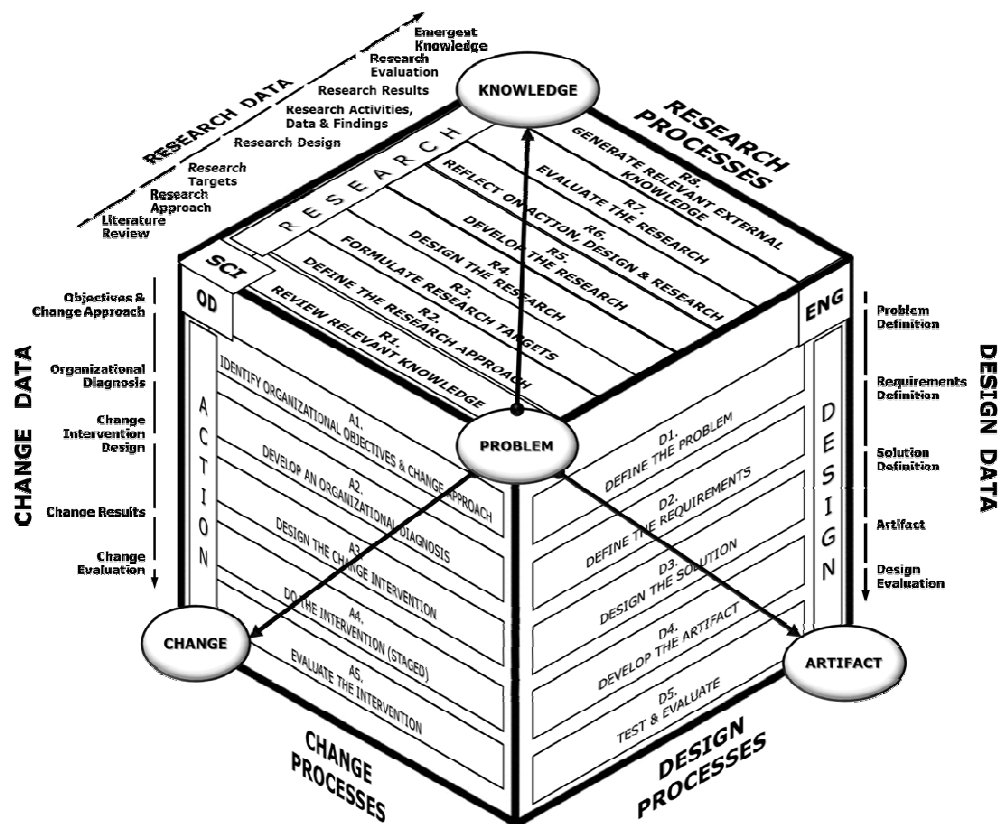


Figure 1. ADR conceptual model – the Science, Organization Development, and Engineering perspectives (Source: Henriques & O'Neill, 2018B)

Based on this conceptual view, and on the associated comprehensive and systematic literature review elements, the previous AR process meta-model (Henriques & O'Neill, 2018A) has been enlarged in order to cover the DSR perspective. Figure 2 summarizes this ADR process meta-model, identifying, for each ADR-stage, its main process steps. It also depicts the associated information flows, in terms of the main data groups being accessed along the whole process.

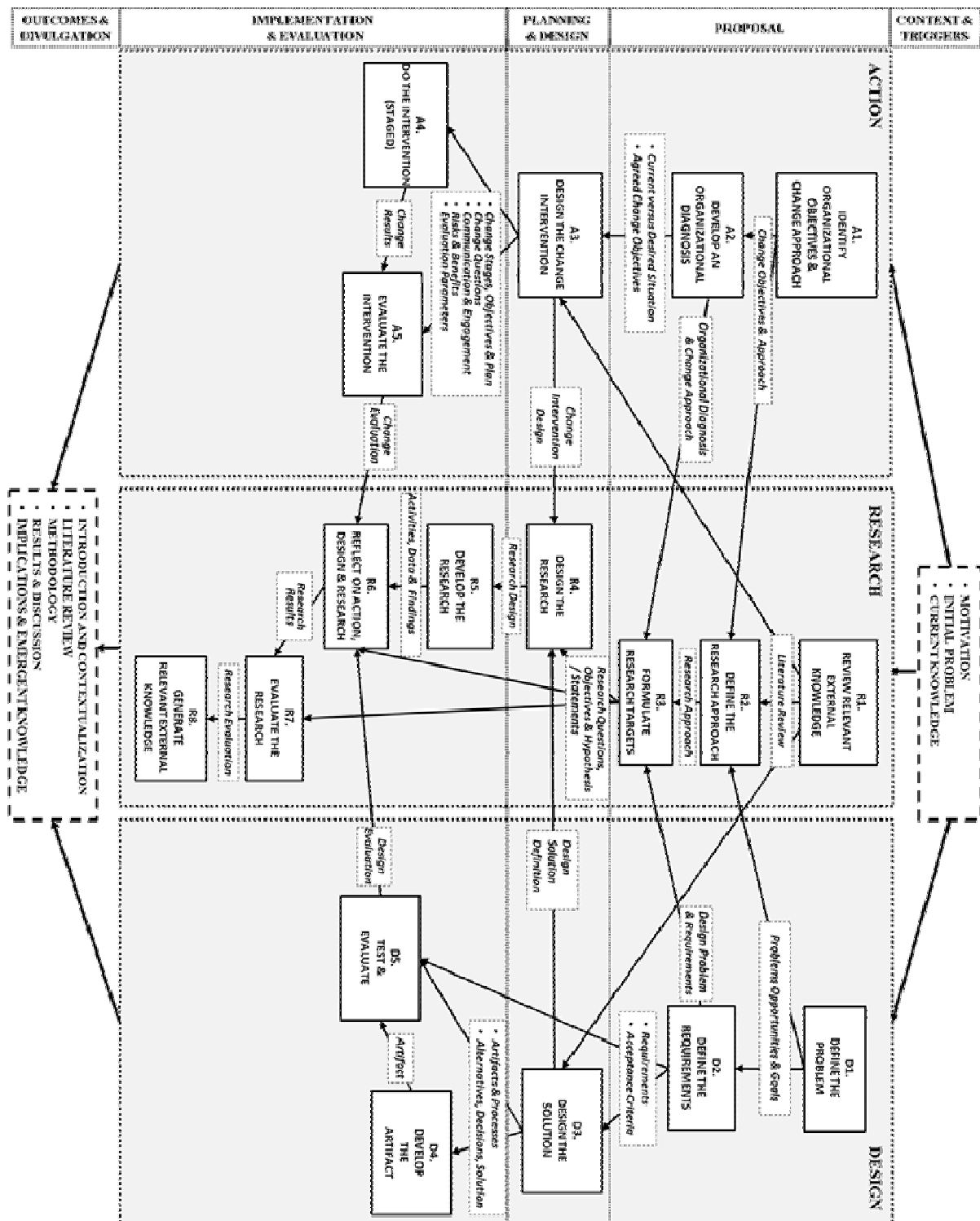


Figure 2. Action, Design, and Research – an Integrated Process Meta-Model

For each of those process steps, a short description, as well as a basic *input-process-output analysis*, has been developed (table 1).

	BASE DATA (INPUT)	PROCESS STEP	RESULT DATA (OUTPUT)	PROCESS STEP - STRUCTURED NARRATIVE DESCRIPTION
RESEARCH	<ul style="list-style-type: none"> External knowledge 	R1. REVIEW RELEVANT EXTERNAL KNOWLEDGE	Literature review (domains, approaches, methods, processes, tools)	Based on external knowledge (necessary to support the research approach, the organizational diagnosis, or the design of the change intervention) select the necessary knowledge emerging from a literature review. Include four main dimensions: (1) research method, (2) research domains, (3) organization development and change literature, (4), and design science and artifact's literature.
	<ul style="list-style-type: none"> Literature review; Change Objectives & Approach Design Problems, Opportunities & Goals 	R2. DEFINE THE RESEARCH APPROACH	Research approach (motivation, gap, problem, purpose)	Based on the design and change approach characteristics, on the relevant knowledge from its context, and on the definition of the change and design problems, produce a definition of the research approach, considering the literature review results.
	<ul style="list-style-type: none"> Research approach; Organizational Diagnosis Change Approach; Design Problem & Requirements 	R3. FORMULATE RESEARCH TARGETS	Research targets (questions, objectives, hypothesis or statements)	Based on the organizational diagnosis and change approach, as well as on the design problem and main requirements, and considering the research approach, define its main targets, including research questions, research objectives, and research hypothesis or statements.
	<ul style="list-style-type: none"> Research targets Change Intervention Design Design Solution Definition 	R4. DESIGN THE RESEARCH	Research design (steps, tools & instruments, data, plan)	Based on the research targets (questions, objectives and hypothesis or statements) and taking into account the Change Intervention Design and the Design Solution Definition, produce a research design definition, including the associated steps, data and tools to be used along the research development stage.
	<ul style="list-style-type: none"> Research targets Research design 	R5. DEVELOP THE RESEARCH	Research development (activities, data & findings)	According to the research targets, and following the research design definitions (steps, data, and tools), develop the associated research activities, collecting and documenting appropriate data evidence and giving evidence of the inherent relevant findings.
	<ul style="list-style-type: none"> Research activities, data & findings Change Evaluation Design Evaluation 	R6. REFLECT ON ACTION, DESIGN & RESEARCH	Action, Design & Research results	Reflect on the action and design, based on the changes and design results and evaluation, contrasting them with the research targets (questions, objectives, and hypothesis) and evidence, making explicit the research results, as a preliminary step to evaluation.
	<ul style="list-style-type: none"> Research results; Research targets 	R7. EVALUATE THE RESEARCH	Research Evaluation	Based on the explicit research results (obtained through reflection) and comparing them with the pre-defined targets, produce a research evaluation.
	<ul style="list-style-type: none"> Research evaluation 	R8. GENERATE RELEVANT EXTERNAL KNOWLEDGE	Emergent Knowledge	Based on the research results and on the previously produced research evaluation, generate relevant external knowledge (to be used on further research and/or be applied within the same or other organizational context).
ACTION	<ul style="list-style-type: none"> Initial organizational problem; Organizational context 	A1. IDENTIFY ORGANIZATIONAL OBJECTIVES & CHANGE APPROACH	Change Objectives and Approach	Based on a relevant initial organizational problem and on adequate knowledge of the organizational context, define the organizational objectives to be reached through (and by) change, and define a change approach with a set of main characteristics which are consistent with the problem, the objectives and the context.
	<ul style="list-style-type: none"> Change objectives & approach; Literature review; Internal knowledge 	A2. DEVELOP AN ORGANIZATIONAL DIAGNOSIS	Organization Diagnosis (Current versus Desired Situation & Agreed Change Objectives)	Having in mind the organizational objectives, the change approach characteristics, and the results of a literature review for the purpose; develop (in place and cooperatively) an organizational diagnosis (identifying the current situation and problems, the desired situation, its main characteristics; the inherent gap, and formulating, and agreeing, on the change objectives).

	BASE DATA (INPUT)	PROCESS STEP	RESULT DATA (OUTPUT)	PROCESS STEP - STRUCTURED NARRATIVE DESCRIPTION
ACTION	<ul style="list-style-type: none"> Organizational diagnosis; Literature review 	A3. DESIGN THE CHANGE INTERVENTION	Change Intervention Design (Stages, Objectives, Plan, Questions, Communication, Engagement, Risks, Benefits, Evaluation Parameters)	Based on the organizational diagnosis and considering the relevant external knowledge (from the specific literature review), produce the change intervention design, including the change plan and stages, the associated relevant questions, its stage objectives, risk, communication, engagement and benefits plans, and change evaluation parameters.
	<ul style="list-style-type: none"> Change intervention design; Internal knowledge 	A4. DO THE INTERVENTION (STAGED)	Change Results	In line with the change intervention design, previously defined, and using internal knowledge, intervene in order to produce the inherent change results, updating internal knowledge accordingly. This usually corresponds to a staged, often iterative, process, producing its outcomes. Being Action Research typically participative, with discovery and interim decisions along the process, internal knowledge is also generated.
	<ul style="list-style-type: none"> Change intervention design; Change results 	A5. EVALUATE THE INTERVENTION	Change Evaluation; Internal knowledge	Based on the change results (produced along the intervention stages), and contrasting them with the change evaluation parameters established during the change intervention's design process (stages, plans, questions and objectives), produce a change evaluation.
	<ul style="list-style-type: none"> Initial organizational problem; Organizational context; Literature review; Internal knowledge 	D1. DEFINE THE PROBLEM	Problem definition (problems, opportunities & goals)	Based on an initial design problem definition and on adequate knowledge of its context, elaborate on a specific definition for the problem, associated goals, application domain, and opportunities to be explored.
DESIGN	<ul style="list-style-type: none"> Problem definition; Literature review; Internal knowledge 	D2. DEFINE THE REQUIREMENTS	Requirements definition (requirements, acceptance criteria)	Based on the problem definition and on the internal knowledge of its application context, and considering the results of the literature review, define the requirements for a possible solution, including its acceptance criteria.
	<ul style="list-style-type: none"> Requirements definition; Internal knowledge 	D3. DESIGN THE SOLUTION	Solution Definition (artifacts & processes, alternatives, decisions, solution)	Based on the requirement's definition and considering the research targets, define an appropriate solution, including the design alternatives and decisions, as well as, the associated artifacts to be built, and design processes to be followed.
	<ul style="list-style-type: none"> Requirements definition; Solution definition; Internal knowledge 	D4. DEVELOP THE ARTIFACT	Artifact	Based on the problem, the requirements, and the solution definition, and using internal knowledge from its usage context, develop the artifact.
	<ul style="list-style-type: none"> Requirements definition; Solution definition; Artifact 	D5. TEST & EVALUATE	Field testing results; Design evaluation	Based on the requirements' definition, test the artifact with the relevant stakeholders, producing a field testing results' report and a formal results' evaluation.

Table 1. Action Design Research – Inputs, Outputs, and Structured Process Narratives

3 Artefact – a Structured Data Model for ADR

Based on these elements – namely on the identification of the main data groups, which are depicted at the previous figure along the lines connecting the sub-processes – it was possible to progress to a more elaborated view of its associated **logical data structure** (figure 3).

Logical Data Structures correspond to a form of representation aimed at providing evidence of the most relevant pieces of data within a system, as well as of their relationships. Several diagrammatic approaches exist to represent logical data structures, targeting different levels of scope, depth, or abstraction. Generally, they use graphical forms to evidence data-groups (alternatively known as data-entities or classes of objects), direct data-relationships (or data-associations), and data-attributes (data properties or items), with associate definitions and descriptions. Using a minimal notation, data-groups are usually represented by rectangles with a significant name inside, and data-relationships are denoted by a line connecting the involved data groups. Usually, for each data-relationship, these diagrams use additional notations to denote the cardinalities (number of entity-occurrences) involved in each side of the relationship.

For the current specific purpose – and considering that most part of the data-relationships cardinalities here represented are of the type “many-to-many” – our diagram only represents the data-groups and the data-relationships, without giving explicit reference of its cardinalities-type and name.

Being data an abstraction of an artifact on its own right, the model depicted at figure 3, together with the associated descriptions, presented at table 2, represent this artifact.

Considering the kind of artifacts which can be produced by a DSR initiative, Gregor & Hevner (2013) define a three-level classification – ranging from “specific instantiations” (Level 1) in the form of products and processes, to more “general and abstract contributions” (Level 2) in the form of “nascent design theory” (e.g., constructs, design principles, models, methods, technological rules), to “well-developed design theories about the phenomena under study” (Level 3). The current artifact – as a data construct which can be used, as an initial guiding model, for structuring and documenting specific, real world, ADR initiatives (instantiations) – clearly fits into the second level (“general and abstract contributions”) included in this classification.

Also, considering that ADR is an iterative process, integrating several cycles of “problem formulation/action planning, artefact creation, evaluation, reflection, and formalisation of learning (Mullarkey & Hevner, 2019), there is a clear need to provide evidence of this characteristic. Figure 4 provides a summary view of these main aspects, including problem, objective and development centred entry points, and the associated process and data components.

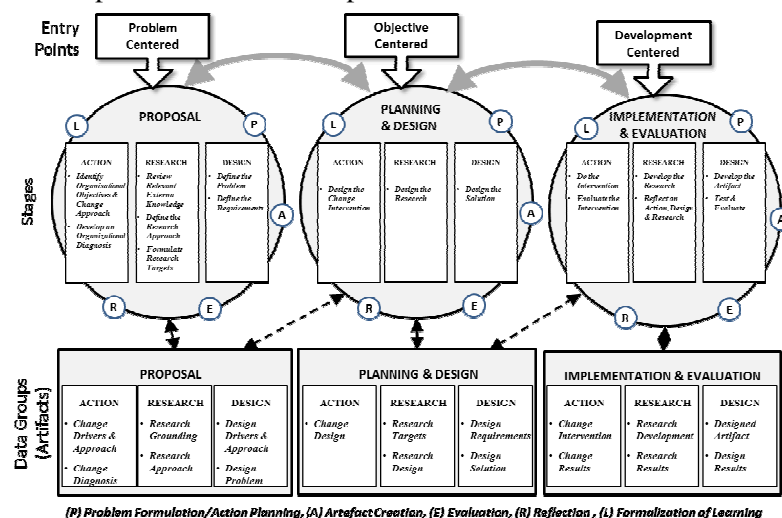


Figure 4. ADR iterations - process, data and entry points.

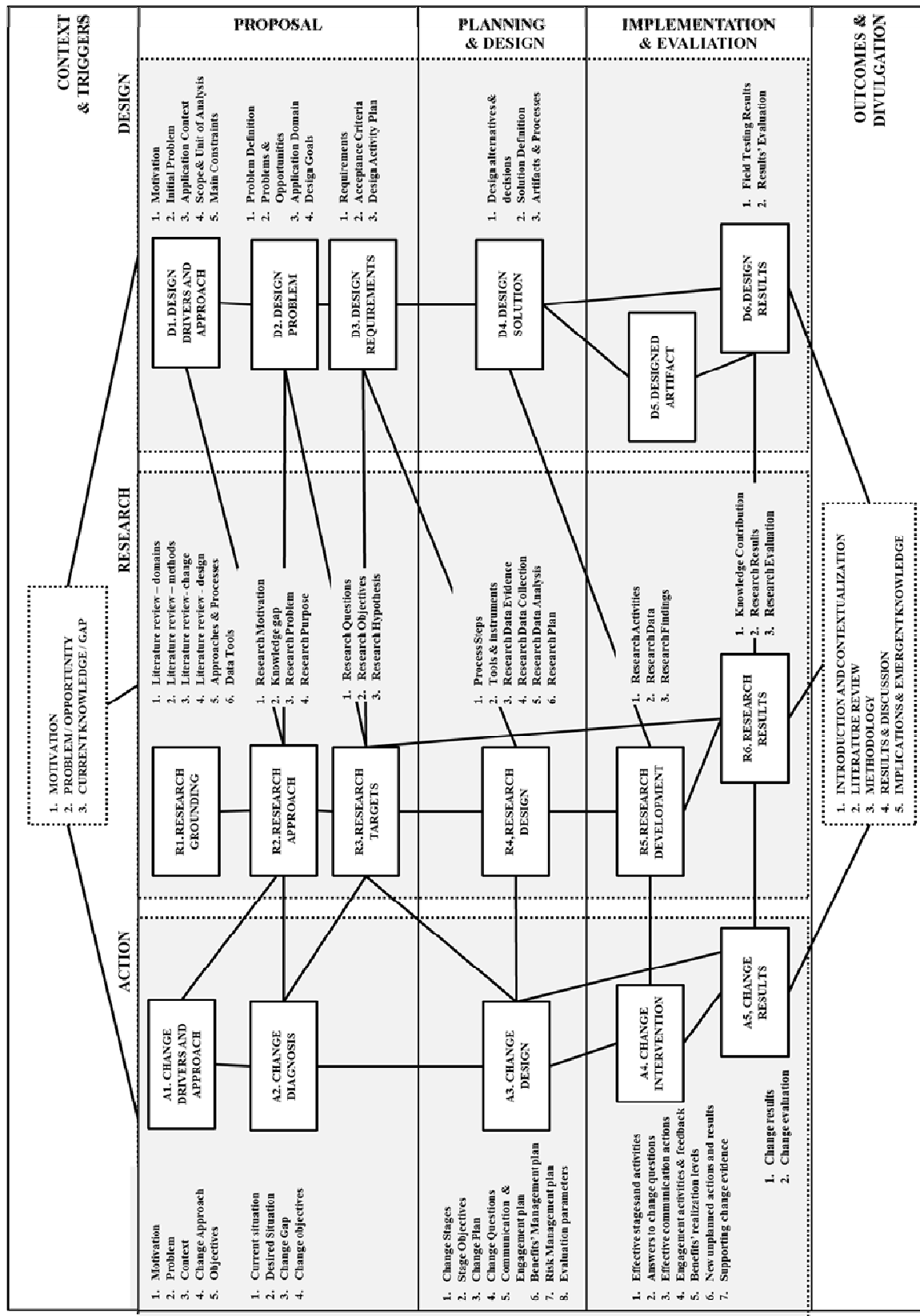


Figure 3. Action, Design, and Research – a Logical Data Model.

Considering that the whole set of data-attributes involved in the above identified data-groups is wide and complex, it has been opted by not representing or describing them extensively. Instead, it has been chosen to complement the diagram with a broad definition of the associated data-groups and, for each one, with an identification of its main data-components (table 2).

		DATA GROUP	DEFINITION	Main data components
ACTION	PRE-RESEARCH	T. CONTEXT & TRIGGERS	Broad description of the context and main drivers for triggering the intervention (in terms of an initial problem to be addressed and of a strong motivation to solve it), summarizing the current internal and external knowledge about the situation and the associated gap to be explored, and including a definition of the associated opportunity for action, design, and research.	<ol style="list-style-type: none"> 1. Motivation 2. Problem / Opportunity 3. Current Knowledge / Gap
	PROPOSAL	A1. CHANGE DRIVERS AND APPROACH	Structured contextualized description of the main change drivers (organizational problem and motivation), of the approach which has been agreed with the organization's decisional stances, and of the associated statement of organizational objectives to be reached during and after the change intervention.	<ol style="list-style-type: none"> 1. Motivation 2. Problem 3. Context 4. Change Approach 5. Objectives
		A2. CHANGE DIAGNOSIS	Contextualized description of the current situation, of the desired situation, and of the relevant gap to be addressed along the intervention – using a rigorous and relevant diagnosis model, and making an explicit definition of the organizational vision, purpose, goals, and change objectives.	<ol style="list-style-type: none"> 1. Current situation 2. Desired Situation 3. Change Gap 4. Change objectives
	PLANNING & DESIGN	A3. CHANGE DESIGN	Structured definition of the main elements which integrate the change plan – on a participative perspective, aligned with the change approach definition and targets, and including the identification of its main stages, objectives, dependencies and open questions to be answered along the intervention. For an open, participative, and non-deterministic intervention, it includes a detailed communication and engagement plan, as well as a risk management plan. A benefits' management plan should also be produced, highlighting the main relationships between the ends, the forms and the means perspectives around the explicitly identified benefits. Include a change evaluation methodology, integrating the associated dimensions, parameters, measurements, timing, and targets.	<ol style="list-style-type: none"> 1. Change Stages 2. Stage Objectives 3. Change Plan 4. Change Questions 5. Communication & Engagement plan 6. Benefits' Management plan 7. Risk Management plan 8. Evaluation parameters
	IMPLEMENTATION & EVALUATION	A4. CHANGE INTERVENTION	<p>Structured report on the change intervention, covering all its stages, dimensions, and main relevant aspects, and providing deep evidence to support the associated findings.</p> <p>Must include information about the effective stages and activities which have been developed, answering to the main change questions, detailing the relevant communication actions, the most important engagement activities, and the corresponding feedback and testimonials from change participants.</p> <p>From a benefits' management perspective it should cover the essential details on benefits' realization levels and actions to be further developed in order to attain its full coverage, as well as the achievement of unplanned benefits.</p> <p>Also, new, unplanned, actions and its results must be included.</p>	<ol style="list-style-type: none"> 1. Effective stages and activities 2. Answers to main change questions 3. Effective communication actions 4. Engagement activities and feedback 5. Benefits' realization levels 6. New unplanned actions and results 7. Supporting change evidence
		A5. CHANGE RESULTS	<p>Essential elements which arise from the change intervention, and its main results, emerging from a reflection based on its targets, planning, and effective implementation.</p> <p>For each of these elements and the associated findings, support evidence must be given.</p> <p>Evaluation of change results - contrasting them with the objectives, and giving evidence of its main outcomes, implications for management, meaning, and relevance for future improvements – must be included.</p>	<ol style="list-style-type: none"> 1. Change results 2. Change evaluation

		DATA GROUP	DEFINITION	Main data components
DESIGN	PROPOSAL	D1. DESIGN DRIVERS AND APPROACH	Broad initial definition of the drivers of the design and of the approach to be followed, including its motivation, initial problem to be addressed, application context (including its stakeholders and design support group), scope and unit of analysis, as well as its main constraints.	<ol style="list-style-type: none"> 1. Motivation 2. Initial Problem 3. Application Context 4. Scope & Unit of Analysis 5. Main Constraints
		D2. DESIGN PROBLEM	Definition of the main problem to be addressed by the design intervention, considering the application domains, the opportunities to solve a wider/broader set of problems, the inherit decisions on scope, and the main associated design goals/objectives.	<ol style="list-style-type: none"> 1. Problem Definition 2. Problems & Opportunities 3. Application Domain 4. Design Goals
		D3. DESIGN REQUIREMENTS	Definition of the main design requirements, including the decision on alternative scenarios of congruent sets of requirements, and producing the inherit requirement specifications, the setting of an acceptance criteria and of an activity plan.	<ol style="list-style-type: none"> 1. Requirements 2. Acceptance Criteria 3. Design Activities & Plan
	PLANNING & DESIGN	D4. DESIGN SOLUTION	Definition of the design solution, including the decision on alternative systems to meet the requirements, its specification, the main characteristics of the artifact(s) to be produced, and the design processes to be followed and associated activities.	<ol style="list-style-type: none"> 1. Design alternatives & decisions 2. Solution Definition 3. Artifacts & Processes
	IMPLEMENTATION & EVALUATION	D5. DESIGNED ARTIFACT	Complete specification, and a produced design artifact, embodying a solution to the problem, responding to stated requirements, and implementing the associated solution. Must include the dimensions, functionalities, and characteristics of the artifact, as well as its trace back to the problem, the requirements and the solution.	<ol style="list-style-type: none"> 1. Artifact
		D6. DESIGN RESULTS	Definition of the effective results of the design of the artifact, evidencing its field testing evaluation of results, and contrasting them with the requirements and objectives of the problem to be solved.	<ol style="list-style-type: none"> 1. Field Testing Results 2. Results' Evaluation
RESEARCH	PROPOSAL	R1. RESEARCH GROUNDING	Structured description of the main groundings for the research intervention (based on a systematic literature review) and including the research domains and disciplines to be explored, the methods to be used, and the change and/or design areas. Should include the relevant knowledge concerning the research approach, processes and data tools. Iteratively produced along the ADR intervention in order to support its main stages' data grounding needs, and being updated according to those needs.	<ol style="list-style-type: none"> 1. Literature review – domains 2. Literature review – methods 3. Literature review- change 4. Literature review - design 5. Approaches & Processes 6. Data Tools
		R2. RESEARCH APPROACH	Global definition of the main drivers for the research approach, including its motivation, associated knowledge gap to be addressed, research problem and main purpose.	<ol style="list-style-type: none"> 1. Research Motivation 2. Knowledge gap 3. Research Problem 4. Research Purpose
		R3. RESEARCH TARGETS	Definition of the main targets to be addressed along the research, including its research questions, objectives and main hypothesis or preliminary statements.	<ol style="list-style-type: none"> 1. Research Questions 2. Research Objectives 3. Research Hypothesis
	PLANNING & DESIGN	R4. RESEARCH DESIGN	Identification and structuration of the essential elements which will integrate the research plan, including its main process steps, specific tools and instruments to be used along the process, data evidence to be collected, and appropriate data collection and analysis tools.	<ol style="list-style-type: none"> 1. Process Steps 2. Tools & instruments 3. Research Data Evidence 4. Research Data Collection 5. Research Data Analysis 6. Research Plan

		DATA GROUP	DEFINITION	Main data components
RESEARCH IMPLEMENTATION & EVALUATION	R5. RESEARCH DEVELOPMENT	Structured report concerning the research intervention development - covering all its stages, dimensions, and main relevant aspects - with a special emphasis on the effective research activities, data, and findings, and providing clear evidence to support it. Should be contrasted with the research design and plan. New activities and additional data (unplanned) should be reported, including evidence of its outcomes, main findings and implications.	1. Research Activities 2. Research Data 3. Research Findings	
	R6. RESEARCH RESULTS	Report on research results' analysis and evaluation, providing a special relevance for its effective findings and associated evidence, in strict relation with the research targets, design and plan, and emphasizing its main knowledge contribution.	1. Knowledge Contribution 2. Research Results 3. Research Evaluation	
POST-RESEARCH	P. OUTCOMES & DIVULGATION	Structured report and publication of the ADR intervention, discussing and putting together its action, research, and design dimensions, in terms of (1) Introduction and contextualization (motivation, problem, context and objectives), (2) Literature review, (3) Methodology, (4) Results and its discussion, and (5) Implications and emergent knowledge.	1. Introduction and Contextualization 2. Literature review 3. Methodology 4. Results and discussion 5. Implications and Emergent Knowledge	

Table 2. ADR – Data Groups' Definitions and associated Data Components

4 Discussion, reflection, conclusions, limitations & future work

AR and DSR – as inquiry practices which address organizational problem solving – generating internal and external knowledge, promoting organizational change, and delivering innovative artifacts – are powerful instruments, on the hands of researchers and professionals, to approach research and development initiatives inside their own organizations.

Combining Research and Organization Development with Engineering – and integrating the AR and DSR paradigms into organizational initiatives – researchers and practitioners can promote double-loop (Argyris, 2002) generative (Senge, 2006) learning, and, at the same time, stimulate the development of useful contributes to organizational excellence and effectiveness.

However, for early-career academics and professionals – facing their first challenges on the usage of such powerful and complex approaches – this task, if not appropriately supported by pragmatic views, can be difficult to accomplish within acceptable levels of rigor.

One of their major concerns involves the understanding and iterative production of appropriate structured data, evidencing the major, intermedia and final, outcomes from such ADR interventions.

This was the main target for the current research work.

Being an integral part of a wider program, the main objective of the current research was to develop an artifact – under the form of an ADR Logical Data Model – providing a “general and abstract contribution” (Gregor & Hevner, 2013) to solve this specific problem.

The resultant artifact addresses five main data subject areas – of context & triggers, proposal, planning & design, implementation & evaluation, and outcomes & divulgation – covering the action, design and research dimensions of ADR. It is contextualized by a conceptual model previously developed by the authors (Henriques & O'Neill, 2018B), and aligns with an ADR process meta-model (figure 2), being composed by a Logical Data Structure diagram (figure 3), a set of data-group definitions, and the identification of the inherit data-components (table 2).

Formally, the development of this model fits Hevner's (2004) seven design principles – emerging from a rigorous research process, as a viable artifact, which solves a relevant problem, having been

previously communicated and evaluated by a technology and management audience, and has been found, within the global context of its application, as providing an effective contribution to knowledge.

Being general and abstract, the model fits the purpose for application to “real world” ADR initiatives (“field instantiations”), being open for further enhancement and adaptation to more specific contexts and circumstances.

It integrates Mullarkey & Hevner’s (2019) eighth principle, which considers that “an ADR engagement will normally move through multiple intervention cycles that shift among stages of diagnosing, design, implementation, and evolution”.

In effect – recognizing that ADR interventions are iterative and convergent approaches to address problems, requirements and solutions – a specific iteration diagram (figure 4) has been produced in order to cope with this principle. It denotes three possible entry points for each ADR cycle (problem, objective and development-centred), integrated with the main stages which are associated with the refinement and production of the associated data.

Considering that a model is always an abstraction – being constrained, as a simplified view of a reality, which is always more complex and may have different patterns for distinct application fields – the current version of the model has, logically, its limitations, being generalist and, maybe, oversimplified.

However, one of its essential formal requirements was to provide a simple and pragmatic view, of the major data structures and components involved in DSR initiatives, to be used by early-career researchers and professionals on their first steps using this kind of approaches. So, a fit for purpose argument applies here to explain the current version of the artifact.

Also – in order to expand and complement the current artifact, progressing towards a field application tool – several limitations, and research opportunities, still persist.

One of them, more immediate, includes the need to aggregate to the model a set of control questions, which may act as main rules to validate the completeness and accuracy of data to be produced for each ADR initiative. The associated research study is already in progress, being object for further publication.

Also, being the current artifact a general abstraction which is open for further enhancement and adaptation to more specific contexts and circumstances, there is space and opportunity for further research, concerning its evolution and/or specialization toward distinct application fields – covering transformative IS/IT applications, which may include, among others, quite distinct areas, such as data science projects, cloud services, social information systems.

In general terms, the overall direction of the current line of research points towards further development of more detailed models, and associated software tools, in order to support, on the field, the general requirements of the AR and DSR community, including researchers and practitioners.

According to these main orientations, further research steps will, progressively, include (1) the model’s refinement and enhancement through generalized field application and testing, (2) the design of a behavioural model, integrating a process-data-event perspective, (3) the specification of the associated system, and, later on, (4) the development, test and refinement of a prototype of a software tool designed to support ADR field initiatives’ development and documentation.

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