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► **To cite this version:**

Marcel Faulhaber, Volker Stich, Günther Schuh, Lennard Holst. Interactions in the Multi-level Distribution Management of Data-Driven Services for Manufacturing Companies. IFIP International Conference on Advances in Production Management Systems (APMS), Sep 2022, Gyeongju, South Korea. pp.270-282, 10.1007/978-3-031-16411-8\_33 . hal-04768970

**HAL Id: hal-04768970**

**<https://inria.hal.science/hal-04768970v1>**

Submitted on 6 Nov 2024

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# Interactions in the multi-level distribution management of data-driven services for manufacturing companies

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**Abstract.** Manufacturing companies (MFRs) are increasingly extending their portfolios with services and data-driven services (DDS) to differentiate themselves from competitors, tap new revenue potential, and gain competitive advantages through digitization and the subsequently generated data. Nonetheless, DDS fail more often than traditional industrial services and products within the first year on the market. Particularly, companies are failing to sell DDS successfully and efficiently with their existing (multi-level) distribution structures. Surprisingly, there is a lack of scientific research addressing this issue. Since there are currently no holistic models for an end-to-end description of distribution-tasks for DDS in the manufacturing industry, this paper contributes to a task-oriented reference model for mapping interactions in the multi-level distribution management. Therefore, a case study research approach is used, to identify and describe the interactions in the multi-level distribution management of DDS, as well as to develop a regulatory framework for MFRs and their multi-level distribution management. This research uses the established theoretical framework of Service-Dominant-Logic to address the co-creation in multi-level distribution management of DDS. As a result, this paper identifies different interaction variants as well as the need for a new management function with 4 main and 14 basic tasks.

**Keywords:** Distribution Management, Data-Driven Services, Case Study Research, Manufacturing, Regulatory Framework, Reference Model.

## 1 Introduction

Against the backdrop of the fourth industrial revolution, the manufacturing sector is on the verge of a transformation from purely manufacturing to equally service-providing companies. Leading industrial companies are already extending their offerings with data-driven services (DDS) and thereby creating new revenue streams. The possibilities offered by Industry 4.0 for generating, storing, transmitting, and processing large volumes of data in real time will drive this trend. With the advancement of digital technologies, the decreasing cost of sensors, and their connectivity via increasingly powerful, Internet-enabled networks known as the Industrial Internet of Things (IIoT), more and more companies are adding DDS to their existing portfolios of products and

accompanying services (Product Service Systems, or PSS). [1] DDS in combination with digital business models represent promising new growth areas in MFRs. MFRs are not only pursuing the development of new revenue streams, but also the strengthening of their product business by offering DDS. Against the backdrop of stagnating technical product innovations and the fundamental expectation of a good product with high quality on the part of customers, the importance of (data-driven) services as a means of differentiation from the competition is increasing significantly. [2] Furthermore, the data derived from DDS is of great strategic and operative importance for MFRs. Historically, data was mainly generated alongside the transactional business processes and managed individually by the respective intra-divisional silos, such as Marketing, Sales, Service, Production, R&D, etc. DDS on the other hand enable MFRs for the first time to get a data-based insight in the usage phase of their products and services. By combining data from various sources, companies can create valuable customer insights for improving business processes, as well as their offerings, all in all to become more customer centric. The thus improved customer experience is the main area where 89% of companies believe they will be competing with each other in the future [3]. Customer centricity not only benefits the customer, but also the MFRs. Customer centric firms not only are up to 60% more profitable compared to their peers [4], but also their business is more resilient [5]. Consequently, being able to develop, sell and operate data-driven services become indispensable skills for future success of MFRs.

In order to ensure customer proximity and support while at the same time minimize their financial invest, MFRs often make use of and rely on downstream channel partners to market, sell, distribute and service their products [6]. Additionally, distribution partners play a key role for the business internationalization of MFRs [7]. While these partners are central to the MFRs' product business, they present a number of challenges for the distribution of services and DDS in particular. [2]. Depending on the partner as well as the DDS, the challenges lie in the marketing (e.g. explanation of benefits), billing (e.g. recurring payments) as well as support during the usage phase of DDS (e.g. technical support). OEMs have to reevaluate central aspects of their current business models and processes, when it comes to selling DDS [8]. In addition to find answers to the challenges mentioned above, companies also must find a way to actively manage and steer the sales of data-driven services, without causing great negative effects on the existing business model. [7, 9] In typical organizational structures of MFRs, the tasks to be performed are located in different areas of responsibility. In addition to internal departments such as sales, digital product management and service, external partners are also involved, which in turn increases the complexity.

In the literature, different aspects have been addressed in different research fields (e.g. channel management, customer relationship management, key account management, customer success management, etc.). So far, there is no consolidated and application-oriented approach to the topic. [2, 10].

For this reason, in successful companies, those responsible for the digital business also take on tasks to coordinate the core business to centrally coordinate and solve the challenges described above. These sales management functions operate at the interface of internal and external stakeholders and coordinate short- and long-term success for

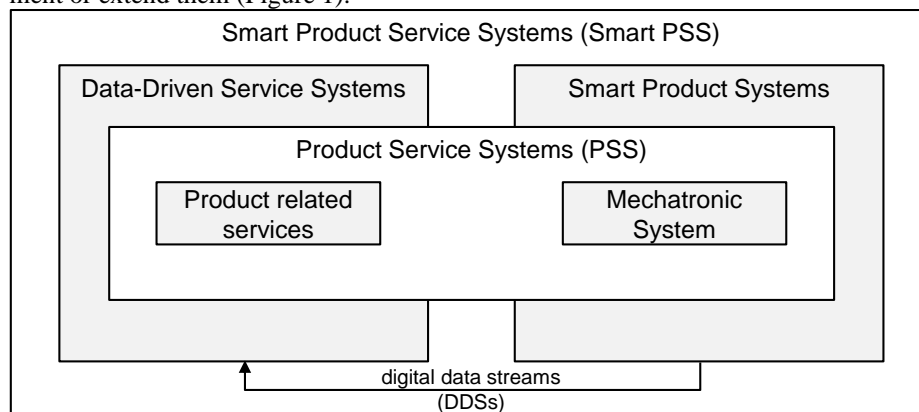
both, product- and DDS-business. Their central task and challenge is, to successfully build up the digital business of MFRs within organizational setups for product and service business. Since this is uncharted territory for practitioners as well as for researchers, a regulatory framework is needed to structure and define the global area of responsibility. Furthermore, a task-oriented reference model enables a more detailed description of the process steps to be completed and thus supports the development and professionalization of the new function.

As a first step, we studied MFRs in their efforts to sell their DDS in established structures, using a case study approach. Our aim in this paper is to identify and describe the interactions in the multi-level distribution management of data-driven services, as well as to develop a regulatory framework for MFRs and their multi-level distribution management.

## 2 State of Research

### 2.1 Data-Driven Services

Data-driven services (DDS) comprise service offerings based on data and ICT, which are provided on demand via electronic interfaces. Data-driven services are services that are linked to physical products as data suppliers (Smart PSS) and meaningfully supplement or extend them (Figure 1).



**Fig. 1.** Categorization and differentiation of DDS based on [11]

Although academic literature and research is frequently addressing DDS, they focus mainly on descriptive approaches of their characteristics and procedures and methods for the development of DDS [12]. Only very limited approaches address the marketing and sales of DDS, let alone multi-level distribution management.

While physical products can be described and compared largely by **search properties** (e.g. price, weight, size, type of material), buyers of services and especially of DDS have to evaluate them by **experience properties** (e.g. repaired machine) and **trust properties** (e.g. prevented failures of a machine) [13]. Due to the novelty of its

performance scope, it is a challenge for MFRs and especially for their distribution partners to sell DDS. Not only the performance scope of DDS is new within multi-level business relationships, but also the respective **revenue** and **billing models**. In an industry characterized by mostly high one-time transactions with established margins, MFRs and their distribution partners reach limits with their processes and IT systems when it comes to billing flat rates (price per available time unit), pay-per use (price per used time unit), pay per output (price per unit produced), pay per success (price per performance increase). In addition to the technical possibility of mapping these billing models, they are also more difficult to explain to the customer.

## 2.2 Multi-Level Distribution Management

“Distribution covers all decisions that affect the path of a product from the provider to the final customer” [14]. Today, distributors have more complex relationships and act as self-reliant retail enterprises with their own market power. Distributors are of great importance to the core business of MFRs, as they are responsible for sales activities towards customers [15].

Distribution channels can be distinguished in **direct distribution** (no independent trading company between the manufacturer and the final customer) and **indirect distribution** (at least one independent trading company between the manufacturer and the final customer). Indirect distribution channels can further be described by their **width** (number of distribution partners used in parallel) and their **length** (number of intermediate distribution partners in one channel) [16, 17].

Recent scientific literature in the fields of B2B Marketing does focus on aspects of digitalization of sales, multi-channel management and solution sales. Existing literature in these fields can be used to lay the groundwork of this paper, but neither multi-level distribution management tasks are described for the sales of DDS. As such, the work of Husmann [18] can be mentioned here, in which he examined “Success Factors in the Market Launch of DDS for Equipment Manufactures”. However, there is a lack of research regarding the topics of multi-level distribution management, the sale of DDS as well as managing multi-level distribution of DDS. Regarding the scientific literature in the field of reference modelling, to this date no explicit models for mapping the interactions between, manufacturer, partner and customer in the multi-level distribution management of data-driven services can be found. This is especially surprising, since MFRs face the challenge, of identifying new ways of collaborating with distribution partners in order to market and sell DDS.

The SDL is a conceptual framework introduced by Vargo and Lusch (2004). In this framework, all economic exchanges are carried out by service, which they defined as “the application of specialized competences through deeds, processes, and performances for the benefit of another entity or the entity itself”. [19] One of the corner pillars of their framework is value co-creation. Creating shared value is a collaborative and two-way process in which actors and entities interact independently to integrate resources for mutual benefit. We use the concept of co-creation to address the interaction between manufacturer, distributors and customers in the multi-level distribution management of DDS.

### 3 Research Process

In order to initially develop a regulatory framework for mapping the interactions in the multi-level distribution management of digital products for MFRs a case-based research method according to Eisenhardt was chosen [20]. This method allows for a practical research process consisting of eight steps, which are listed in Table 1.

**Table 1.** Case study process and implemented research activities, based on [20]

Process step	Activities	Realization within the research process
I. Getting Started	Define the research question(s)	How can the interactions in the multi-level distribution management of DDS be described? How does a regulatory framework for multi-level distribution management of DDS look like?
II. Selecting Cases	Specify population	Examination of 13 MFRs and 5 distributors between 2019 and 2022 with an established product and service business as well as with DDS in the branches printing, industrial tools & equipment, medical devices, industrial & automotive supplier, intralogistics, agriculture, cleaning equipment, food industry equipment, heating products & industrial cooling systems, electrical connection technology.
III. Crafting Instruments	Combine data collection methods	Telephone and in-person interviews, workshops, internal documents, secondary source documents.
IV. Entering the Field	Overlap data collection and analysis	Two iterations: 1. Deriving conceptual interactions. 2. Transferring results into a regulatory framework.
V. Analyzing Data	Identify cross-case patterns	Comparing distribution approaches and tasks performed by MFRs.
VI. Shaping Hypotheses	Confirm, extend, and sharpen theory	Conclusion after two iterations: Two major interaction approaches, 4 order-giving dimensions and 14 basic tasks were identified.
VII: Enfolding Literature	Compare with conflicting and similar literature	Comparison with existing literature, regulatory frameworks and task-oriented reference models presented in section 2.
VIII. Reaching Closure	Observe theo. saturation (when possible)	Observed flattening curve regarding knowledge improvement.

### 4 Results

The following sections 4.1 and 4.2 present the results of the first and second iterations of the conducted case study research. As a result of the first iteration, the different types of interactions were identified. Building up on the first iteration, the result of the second iteration in combination with the conducted literature review presented in section 2, the regulatory framework was derived.

#### 4.1 Types of Interactions for Manufacturing Companies and Distribution Partners

In order to describe the interactions between MFRs and distributors, **exchange objects** are used as the level of consideration. They are at the center of the business relationship and include products and services, financial flows as well as information and data [21]. They build the basis for the cooperation between manufacturer and sales partner, because only through them the sales partner can take over the sales task. The special characteristics of the exchange objects generally include the scope, quality and time, e.g. the attractiveness of the financial conditions, the timing of the information or the quantity of the services provided.

**Financial flows (funds)** are the counterpart of commodity flows (products and services) because they express the value of the commodity flows and can be used to measure the contribution to the monetary targets of the manufacturer. Since a payment flow from the sales partner to the manufacturer means a positive target contribution for the latter, quite in contrast to the sales partner, a conflict of interest arises. The desire for better conditions is therefore more or less inherent in the system.

In this context, **information** is understood to mean verbal and numerical content of the most varied nature. In particular, information on customer contact data, inquiries, orders, customer statements, customer requests, etc., but also reminders, invoices, statistics, etc. is exchanged between the manufacturer and the distributor. Against the background of DDS, these mainly focus on the valuable DDSs from the customer usage phase described in section 1 and 2.

Finally, the actual **products and services (offerings)** that are sold to the customer are to be included to describe the business interactions. Depending on the individual scenario, products and services can be offered to the customer by the different players (manufacturer and distributor). Products and services can either get passed on along the distribution levels, with each individual level being remunerated for its contribution (e.g. commission model) or levels can be skipped and a competitive situation between manufacturer and distributors can arise.

The following Figure 2 illustrates the basic interactions between the key actor's manufacturer, distributor, and customers in a typical multi-level product distribution setup. The manufacturer sells the product to the distributor, who then sells it to the customer. Based on the individual situation, distributors keep a margin ( $y$ ), when compensating the manufacturer. Within the manufacturing sector, distributors often have information on their customers, which they do not share with the manufacturer, because of the fear to lose their business to them.

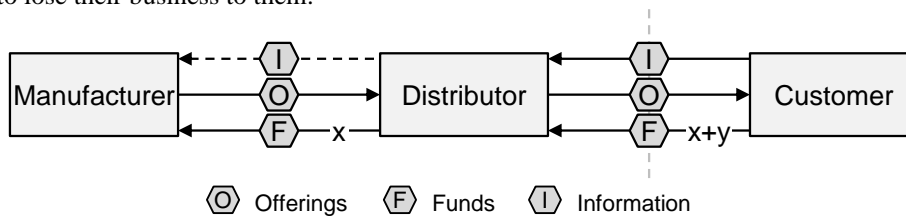
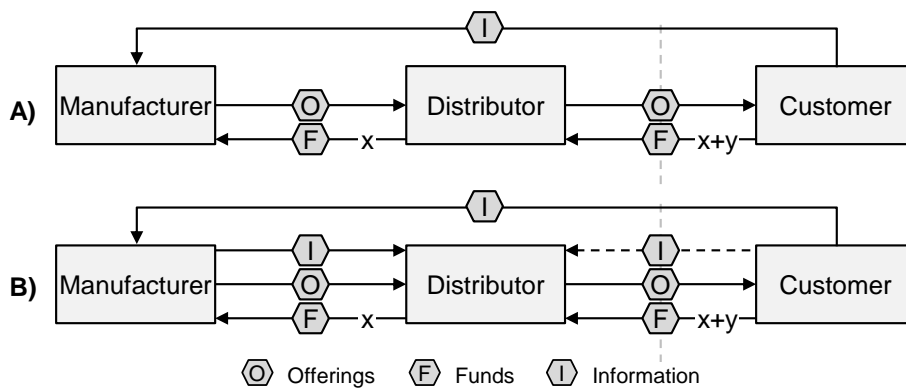


Fig. 2. Interactions for a multi-level product distribution



However, when it comes to the multi-level distribution of DDS, different approaches for the interactions between MFRs and distributors can be observed. MFRs either integrate their distributors in the sale of DDS (indirect distribution of DDS), or they build up capacities on their own to sell DDS by themselves (direct distribution of DDS).

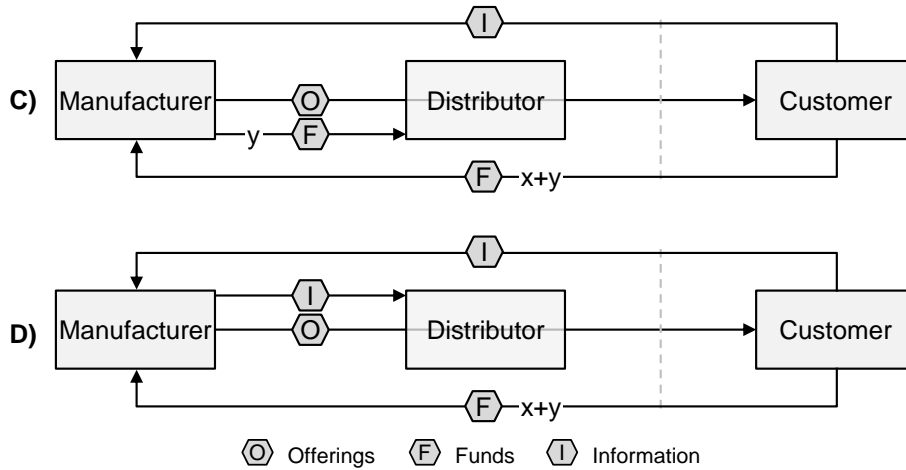
Figure 3 illustrates two different variants (variant A and variant B) for the **integration of distributors** by MFRs. In both variants, MFRs are using the active salesforce of their distributors to market and sell DDS to their customers. Distributors in the variant A receive a margin ( $y$ ) based on the sold DDS and its respective generated revenue. Although the margins of DDS are very attractive compared with services and especially compared with product business, the overall revenue is rather small compared. Due this reason, distributors are often not incentivized to offer DDS to their customers, which is why MFRs integrate distributors into the generated information flow and let them participate on insights regarding customer needs and behaviors. Depending on the individual setup, as well as the digital maturity of the distributors, they either receive processed data and information from the manufacturer (solid line from manufacturer to the distributor) or they receive the raw data (dashed line from customer to the distributor). Depending on who is the contracting partner for the customer (legal setup for DDS), funds can also go directly from the customer to the manufacturer, who then compensates the distributor.



**Fig. 3.** Interaction variants for a multi-level DDS distribution while integrating distributors

Finally, Figure 4 illustrates two different variants for the interactions when MFRs follow a direct approach for the distribution of their DDS. In these cases, manufacturer decide to use their own salesforces (if already present) or build up new salesforces in order to directly sell DDS to the customers. In practice, companies decide in favor of this variant if they have already failed with the distribution of DDS via their partners, or if they do not view the distribution of DDS via their partners as being very successful due to the need for explanation and the low sales volume of DDS transactions. However, the direct approach of customers by MFRs puts a strain on the relationship between MFRs and distributors, as they get the impression of becoming obsolete. Since the MFRs need the partners in the future for the success and efficiency of their core business, they compensate the distributors responsible for the customers. This is

analogous to direct sales, either via the provision of information to strengthen the product and service business (variant C), via a revenue share from DDS (variant D), or a combination of the two variants.

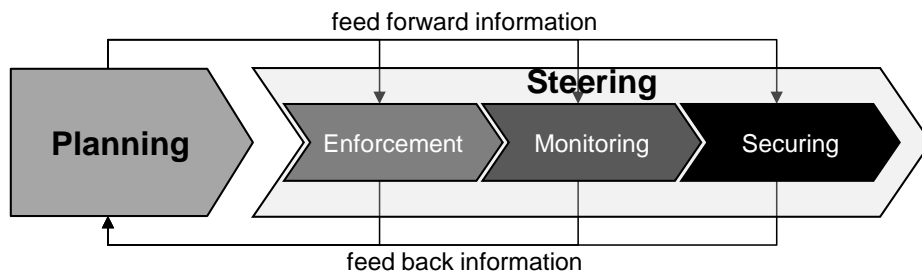


**Fig. 4.** Interaction variants for a multi-level DDS distribution while integrating distributors

Regarding the identified interaction variants, the authors did not expect to observe multiple interaction variants at once in use at the companies. Moreover, it seems worth mentioning to the authors that the observed interaction variants change and evolve over time. The ongoing research sets out to identify patterns and development paths.

#### 4.2 Regulatory Framework for the Multi-Level Distribution Management

Based on the fundamental interactions described above, MFRs are forced to take on new tasks in multi-level distribution management. At first, a regulatory framework of the reference model is presented in Figure 5, serving as a top-level guidance tool for a task-oriented reference model, which needs to be developed in future research.



**Fig. 5.** Regulatory framework of the task-oriented reference model for multi-level distribution management of DDS based on [22]

The illustrated regulatory framework consists of four consecutive main tasks, which can be differentiated in the two levels “planning” and “steering”. The four main tasks (order-giving dimensions) are not only to be run through and interconnected in the sense of a waterfall logic, but furthermore, with the connections "feed forward" and "feed back" to the planning level, they have an exchange of information for the constant regulation and continuous improvement of the multi-level distribution management of DDS.

In the following, the currently identified basic and elementary tasks are assigned to the four main tasks shown in the regulatory framework, see Table 2. Within the first order-giving dimension (**Planning**) MFRs need to derive operational (attainable, action-oriented, short-term) objectives for their DDS, based on the overall company strategy. Based on this, companies need to derive a sales strategy for their DDS that pursues the operational objectives. This in turn serves as the basis for the organizational and resource planning of multi-level distribution management. Essential for this basic task is the correct analysis and evaluation of the existing sales channels, the DDS distribution-relevant characteristics, as well as the customer segments to be served. The tasks within the first order-giving dimension are performed by the MFRs and their distribution or partner managers. The second order-giving dimension (**Enforcement**) copes the actual sale of the DDS to the customer and user. Based on the individual sales channel setup, the competences, and capacities of channel partners the basic tasks identified here can be performed by either the manufacturing company or their service and distribution partners (compare interaction variants described in chapter 4.1). Starting with identifying potential customers for the DDS in the prospect management, the actual transaction and sale of the DDS, as well as supporting the customers and users with their needs after buying the DDS. In contrast to the one-off, transactional product business, the monitoring of customer loyalty and the tasks of customer churn prevention and customer recovery based on this are key to the long-term success of the companies in the sale of DDS. The third order-giving dimension (**Monitoring**) contains the tasks determining deviations from the derived sales plan and strategy, as well as identifying the root causes for these deviations. Compared to long-term sales goals for product and service business, MFRs must monitor the sales success of DDS more frequently. Within the fourth order-giving dimension (**Securing**) the MFRs act upon identified deviations and their sources of interference. By deriving countermeasures, implementing them and checking up on their effect, MFRs have to deep understanding of their customer and partner needs, as well as of their DDS performance.

**Table 2.** Basic tasks assigned to the main tasks of the regulatory framework for multi-level distribution management of DDS

<b>Main task</b>	<b>Basic task</b>
1 Planning	1.1 Operationalize objectives
	1.2 Definition of the sales strategy
	1.3 Organization and resource planning
2 Enforcement	2.1 Prospect management
	2.2 Sales

	2.3 After-sales support
	2.4 Customer loyalty
	2.5 Customer churn prevention
	2.6 Customer recovery
3 Monitoring	3.1 Determine sales plan deviations
	3.2 Identify sources of interference
4 Securing	4.1 Derivation of countermeasures
	4.2 Ensuring the implementation of measures
	4.3 Ensuring of the measure's success

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## 5 Conclusion and Further Research

In this paper, a research process was described for deriving a regulatory framework for the multi-level distribution management of MFRs. The purpose of this work was to identify and describe the interactions of MFRs and their distributors with their customers in regards of DDS. Based on the identified conceptual interactions identified in the practice-oriented case study research process, the need for a new management function was identified. Considering the needs in practice as well as existing research regarding sales steering concepts a regulatory framework with 4 main tasks was defined. The 4 main tasks were further detailed by describing 14 basic tasks.

As for future research, further investigations are required focusing developing a task-oriented reference model. This reference model should describe on a functional layer, what the reference functions for MFRs look like. By further adding the layer of a data model and creating a combined process view in order to support MFRs with a complete reference model for the setup of their new sales function. As this research process is in process, the final testing and validation of the currently identified (basic and elementary) tasks is ongoing. Additionally, there is a need for further research regarding the measurement of quantitative effects of the sales management function in order to capture and prove its long-term benefits. Finally, recommendations for the implementation of the reference model need to be derived to support companies in a successful adaptation of the new management function.

## 6 Acknowledgement

The research project that forms the basis for this report is funded through an industry consortium of MFRs. This project is managed by the Institute for Industrial Management (FIR) at RWTH Aachen University and the Center Smart Services (CSS). The authors are responsible for the content of this publication.

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