

OPEN CONTROL GOVERNANCE IN COLLABORATIVE COLLECTIVE-INTELLIGENCE SERVICES

- A COMPARATIVE CASE STUDY
BETWEEN WIKIPEDIA AND NAVER KNOWLEDGE iN -
Completed Research Paper

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Abstract

In this paper, two cases with Naver Knowledge iN and Global Wikipedia were analyzed in order to study the control issue in open collaborative business structure. The collected objective data in each case was conducted by framework of control structure analysis to be suggested in this study. In conclusion, Wikipedia is completely open and decentralized to participants in control structure, and in this governance the quality of contents has improved by using the control mechanism based on consensus, whereas in Naver Knowledge iN having a hierarchical control structure, its quality of contents tends to be degraded with time. This study is significant in the sense that an empirical study was conducted with the concept of control governance, through the analysis of difference in quality caused by different operational strategies. It will also contribute to many businesses for collaborating with unspecified external participants in setting up control structure as a useful framework.

Keywords: open collaboration, control mechanism, collective intelligence, decentralized control structure

Introduction

Wikipedia or Open Source Project is to create new business models by the participation of unspecified individuals, and thus they may be recognized as effective strategies that enable under-resourced and ineffectual organizations to aggressively confront environmental changes (Aaker 1984). In the same context, many businesses have pursued open innovation, instead of internal R&D, so as to develop products by applying external resources and technologies and to make profits by out-licensing their own technologies (Chesbrough 2003).

As aforesaid, outside collaboration makes it possible for businesses to secure resources without needing to possess and manage, and moreover to find collaborators through crowd sourcing or collective intelligence models to which unspecified individuals participate, not contract-based outsourcing.

In open collaboration that aims to carry out successful business with unspecified external resources, individual participation-based production and multiple participation-based social production function are important mechanisms. With the successful cases of open collaboration, a debate surrounds the issue of how to involve unspecified individuals and to apply them.

In this regard, previous studies have been focused on ‘motivation’, the problem of whether outsiders aggressively participate without rewards, ‘operation’, the problem of whether they can be coordinated without controllers, and ‘diffusion’, the problem of how they would compete with existing products or services (Bonaccorsi and Rossi 2003; von Krogh and von Hippel 2006).

Differently than hierarchical control in which the business intervenes, however, self-governance has been achieved by individual participants like self-organization suggested by Ostrom (1990), self-censorship and decentralized control have achieved by Wikipedia. It is realized as a important mechanism but, there is still the early stages of research about how to apply such results to open collaboration.

In this connection, this study compared two cases, Wikipedia and Naver Knowledge iN in operational policies from the aspect of control structure, also analyzed the difference in quality caused by different operational strategies with time. Above all, this study suggested a control structure analysis framework by making reference to previous theories. With the framework, a comparison was made between the two in order to identify control governance suitable for each collaboration structure.

Theoretical Background

In this study, ‘open collaboration’ is defined as an inclusive concept that it’s a kind of strategy or tool of business to collaborate with various external individuals in aspect of securing external resources.

Pisano and Verganti (2008) mentioned that the collaborative innovation of businesses might be achieved by the efficient application of external resources, classified the structures of the collaboration into four types, and presented strategies suitable for respective types. As shown in Table 1, one criterion is about the openness of membership, *i.e.*, a matter of whether it is opened to unspecified individuals or is led by the business or is intended for private communities. Another is about the flatness of governance structure; specifically, a matter of whether issues and solutions may be presented only by a specific one or a large number of participants. Particularly in the flat form, costs or risks may be shared inasmuch as governance is decentralized or is made by collaborators together.

Table 1. The Four modes of Collaboration in study of Pisano and Verganti (2008)		
Governance Participation	Flat	Hierarchical
Open	Innovation Community Example : Linux open-source software community	Innovation Mall Example : InnoCentive.com website, where companies can post scientific problems
Closed	Consortium Example : IBM’s partnerships with select companies to jointly develop	Elite Circle Example : Alessi’s handpicked group of 200-plus design experts, who develop new

	semiconductor technologies	concepts for home products
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This framework shows concepts useful to analyze the cases of open collaboration, but in practice it has several problems.

First, it does not distinguish the transaction phase of collaboration from other phases but deals with them comprehensively. In the case of a Linux OSS project, for instance, this framework is made by the professional participants' collaborative process and thus may be regarded as the flat form. But in the study of Malone *et al.* (2009) who classified collective intelligence-based collaboration as to constituent, it is defined as a miniature hierarchy because next-version software is finally selected by Tovalds and a small group.

Second, the level of openness varies in different services, and thus it is difficult to clearly distinguish openness from closeness. To give an example, the Apple App Store is known to be an open participation, but actually participation is possible through authentication in registration of application. Thus, it is problematic to classify this case as open.

In this study, hereat, the framework of Pisano and Verganti (2008) was complementarily corrected and this revised framework was used to analyze the governance of open collaborative service.

In the framework of Pisano and Verganti (2008) the transaction phase is to define a problem and at the same time to choose a solution, but in this study, it was divided into three phases occurring collaboration; specifically, 'submission', 'output evaluation' and 'monitoring & quality control.' During the 'submission' phase, individual participants suggest and produce outputs. During the 'output evaluation' phase, the final product is determined and the incentive is offered, and during the 'monitoring & quality control' phase, quality is controlled by operational regulations and crisis management.

The problem of openness level, which varies in different services, was complementarily corrected by governance mechanisms of various levels that can be applied to cases of which openness levels vary depending upon the phase, on reference to previous studies (Pisano and Verganti 2008; Malone et al. 2009; Ostrom 1990; Benkler 2002; Wathe and Heide 2000; Decker 2003; Ouich 1979).

Table 2. Framework for Analysis of Control Governance			
A point of Control		Control type	Control Mechanism
Entry (Participate & Access)		Open	Subscription Conditions - Prequalified / Skilled Access level & Authority Social role
		Closed	Screening - Permission structure Contract Personnel
Transaction (Collaboration Occurrence)	Submission	Market	Formalization - Contents Stylistic convention (Writing style, Language, Attribution) - Submission system Policy making (Consensus-building mechanism)
		Hierarchy	Allocation / Assignment Formalization - Conventions, Submission form etc
	Output Evaluation	Market	Consensus-building method Discussion (interaction) Voting, Rating, Marking, Grade (individual acts) Peer review Intrinsic reward (Love, Glory, Reputation)

		Hierarchy	Screening Selection Extrinsic reward (Money, Point)
	Monitoring & Quality Control	Market	Peer review (Consensus-building mechanism) Specialist-review Consensus-building method SW program
		Hierarchy	Appraisal Report Administrator SW program

During the ‘entry’ phase when participants are governed, the mechanism of open governance can be implemented by skill or prequalification necessary for subscription or participation, access level & authority, and responsibility for social role. The mechanism of closed governance can be implemented by permission for participation, participant screening, contract and personnel management.

Actually in the case of the transaction phase, formalization mechanism and policy-making mechanism may be applied to the market-type governance during the submission phase. The formalization mechanism is to formalize markup language, content properties and submission in order that outputs, produced by participants with various characteristics, may be standardized. The policy-making mechanism is to allow participants to modify and improve internal regulations. Contrarily in the case of hierarchical governance, the business govern such things by itself and so every kind of tangible formalization, whereat the business drives, may be applied to the allocation of resources, the assignment of roles and other production processes.

In the case of market-type governance during the output evaluation phase, participants’ consensus may be derived by voting, rating, marking and grading or by discussion. In addition, reward mechanism takes an important part in keeping participants’ inherent motive. In hierarchical governance, the business directly intervenes in the evaluation and selection of output by applying its own methods of screenings and selections. In this case, participants are on the receiving end of output evaluation, for the final decision is made by the business. Therefore, it is important to reward them.

In market-type governance during the monitoring & quality control phase, collaborative activities and outputs may be mechanistically monitored in succession. In addition to peer review, specialist review and consensus, an on-line robot program may be applied to review the conformity to guidelines. In hierarchical governance, they may be managed by business through appraisal, report, administration and otherwise controlled directly.

The Research Methodology

Data Collection

This study was conducted on Wikipedia and Naver Knowledge iN service. In both of them unspecified individuals participate and produce knowledge. In addition, the clear collaboration amongst unspecified participants, clearly different governances, and opened service rules or guidelines made it easy to collect data.

In this study, data were collected from rules, policies and guidelines posted on their sites. In Naver Knowledge iN, data were collected from Knowledge iN help, Knowledge iN rules and Naver user agreement. In Wikipedia, data were collected from policy, rules, disclaimers, guidelines and help.

Method

There has been no study on control structure to identify the cause of why difference in quality occurred in the process of open collaborative production, to the best of our knowledge. It is problematic to apply the existing theories of organization control or control mechanism to respective cases, hence in this study the control analysis framework was remade as shown in Table 2.

Thus, objective data collected from respective cases were comparatively analyzed as a case study by the above-mentioned control analysis framework.

The results of analysis by the framework were reviewed by inter-researcher verification on the basis of objectivity in collected data, were posed already in each website.

The Results

Cases Review

Wikipedia is a global internet encyclopedia. As of 2011 it is operated with 286 languages, and about 3.7 million articles have been posted. Views per hour reaches about 8 million (<http://stars.wikimedia.org/EN/Sitemap.htm>).

It has been recognized as a typical example of collective intelligence to make an on-line encyclopedia, because it allows anyone to produce knowledge and information. Participants are allowed to edit any documents, and all edited contents are recorded and managed, but there are no centralized editorial rights. The contents are edited by 11 methods, i.e., information addition, link addition, term change, information deletion, link deletion, format change, grammar correction, turn back, spelling correction, style change and Vandalism including criminal damage such as graffiti and defacement directed towards any property without permission of the owner. (Pfeil et al. 2006). If conflicting opinions or repeated editing are observed, the relevant articles are transferred by the administrator to the discussion page so that debates may arise as to them (Hwang et al. 2009).

Wikipedia is based on the most basic principle in order that participants may favorably collaborate with each other. It is neutral viewpoint, which is to prevent participants from maintaining their subjective opinions but to describe facts and objective opinions. What is important is that such contents should be verifiable, and that unannounced or unpublished contents should not be written by the principle as no original research (Park 2007). This principle is applied to contents that are posted on Wikipedia, and so data on Wikipedia may be regarded as objective. Over the left, however, the contents may be regarded as a knowledge already known (Bruns 2008).

Naver Knowledge iN is a service of Naver, a portal site in Korea. It enables users to share their knowledge. If a user posts a question, other users voluntarily give answers. The service was launched in 2002, and in 2004 more than 10 million contents have been posted. In Korea it was once recognized as a successful model (Lee et al. 2009) but the quality of contents tends to be degraded with time. As a result, mileage system and rank system have been introduced on purpose to keep users.

The mileage system is to accumulate points whenever users log in, ask questions and give answers, and the points are given from askers to answerers. Users may be restricted by points in registering their answers, stating their opinions and recommending them, and are graded as to the number of answers and chosen ones (Lee et al. 2009).

Naver Knowledge iN provides services such as 'Knowledge Q&A', 'Open Dictionary' and 'Expertise Q&A.' Open Dictionary is a kind of on-line encyclopedias, whereof contents are made by users. Expertise Q&A is to get answers from specialists in medicine, law and otherwise. Such services are limited to Naver subscribers. A user who posted question should choose the most preferring answer to his question. After he chose a answer, additional answers cannot be posted. Hwang et al. (2009) mentioned that Naver Knowledge iN made it possible for people in various classes to give answers free from interference and to see similar questions at a glance.

Results

Both Wikipedia and Naver Knowledge iN have collaborative production models. But as stated by Dutton (2008), the former is a type of co-creating collaboration based on participants' collaboration, whereas the latter is a just

contributing collaboration based on each individual's contribution. As a result, they are remarkably different in knowledge production process and control structure.

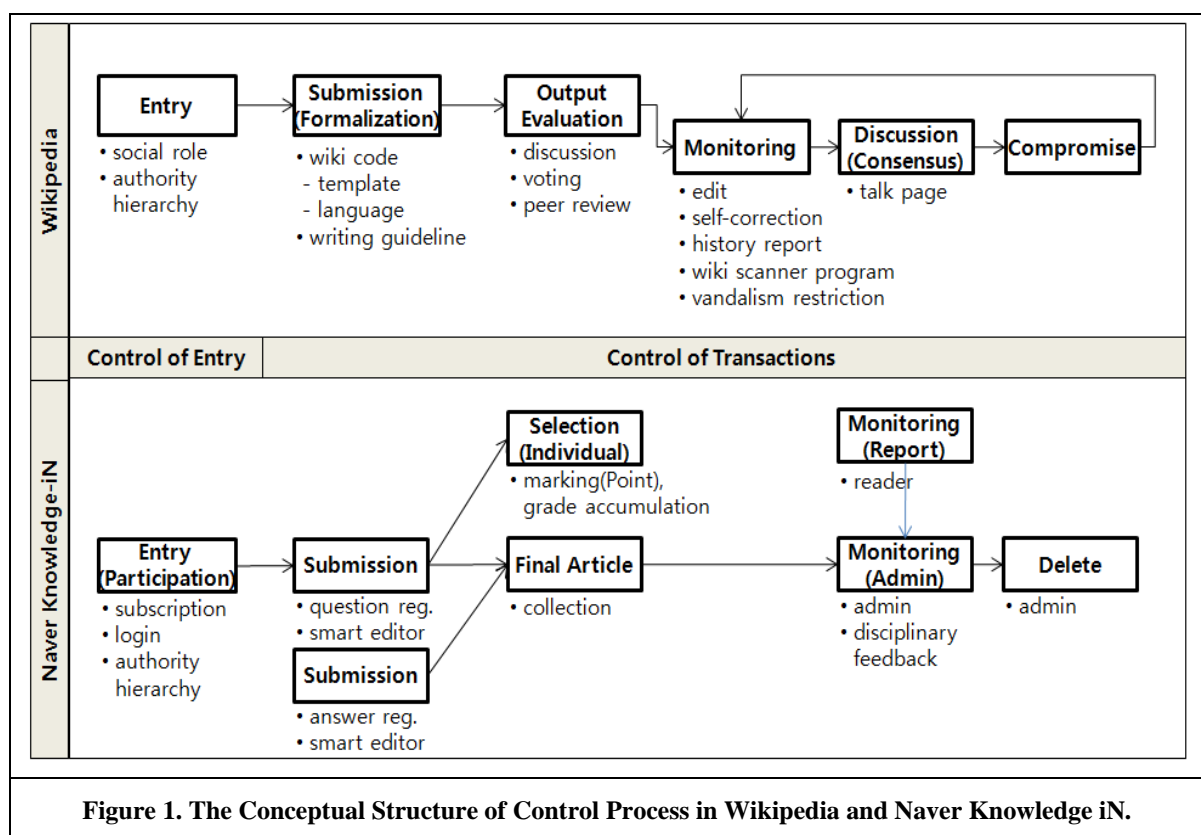
The reason is that the two have different purposes. As stated repeatedly, Wikipedia is an on-line encyclopedia. Right knowledge is crucial for an encyclopedia, and involves continuous counsels and debates. Therefore, its contents are described by objective facts and opinions. In the case of Naver Knowledge iN, on the other hand, it is not certain that answers are right all the time. Instead, it provides experiential information as much as possible. So, many answers are given to one question, which include theoretical and abstract knowledge, subjective counsels, opinions and know-hows.

Resultantly, the two become different in the quality of knowledge. Wikipedia aims at common knowledge, whereas Naver Knowledge In aims to meet the needs of questioner as the best answer is chosen by the questioner's subjective judgment. In Wikipedia, specifically, the knowledge is finally chosen after multiple participants' consensus and modification, and is advanced by intercalibration. So, rules and guidelines become more detailed with time. In case existing articles do not satisfy the improved rules or guidelines, they may be modified or deleted through review process. Though an individual supplies information he believes right, it may be modified or deleted if multiple participants do not accept. On this wise, the optimum information is chosen by common consensus.

On the contrary to Wikipedia, Naver Knowledge iN aims at questioners' choice and satisfaction. Answers' mileages vary depending upon questioners' satisfaction. Moreover, it does not distinguish between right and wrong but let given answers go. Writings are once posted, they cannot be easily modified, which is to secure data quantitatively. Writings increase in quantity, but there is no process to improve their quality.

In this study, an analysis was made of the difference between the two in collaborative method and control structure, whereto the control analysis framework Table 2 was applied.

As shown in Fig.1, the two were compared with each other in knowledge production and control process at respective phases. In Wikipedia, knowledge is produced through repeated modification and improvement, but in Naver Knowledge iN, most of writings become directly final products except things against operational regulations.



As shown in Table 3 and Table 4, the two were analyzed by the analysis framework.

Table 3. Control Structure during the Entry Phase			
Case	Control Type	Control Mechanisms	Results
Wikipedia	Open	Complete Opening – It is possible to post writing without subscription, just as IP address. Roles are given for effective management. - All the users can participate with equal rights and contribution. -The administrator is elected by users' votes, and takes charge of quality control. -The arbitrator is elected by users' votes and is appointed by the Wikipedia foundation, and takes go-between roles.	Since consensus is based on participants' votes, it is possible to prevent useless debates and to realize self-government.
Naver Knowledge iN	Open	Conditional Opening – It is necessary to subscribe and log in Hierarchies are given to attract subscribers. User rights vary depending upon the hierarchy. - The point (commoner, citizen and middle class) and grade (probie, experienced, master, hero, great master, superhuman, plant god, wind god, moon god, star god and sun god) vary depending upon the level of contribution. - An honorary intelligentsia, selected by level of point and grade, has different level of authorities. - Only specialists listed in relevant associations (doctors, lawyers, labor attorneys, etc.) are qualified to give answers to technical questions. - Administrator is the staff at Naver has the authority to modify and delete contents, and takes go-between roles.	The hierarchy system makes it possible to attract individual participants.

During the early entry phase, both of them are open to those who want to participate in that they do not put restrictions or suggest prior qualification. In particular, Wikipedia allows them to post writings only with IP address information. In the case of Naver Knowledge iN, however, only subscribers can post writings after logging in. Also, only specialists listed in relevant associations are qualified to give answers to technical questions.

Table 4. Control Structure during the Transaction Phase				
Case	Type	Phase	Control Mechanisms	Results
Wikipedia	Market	Submission	Early control under detailed formalization - Contents, going against markup language and guidelines, are deleted. - Wiki codes such as syntax, style, template and Cite.php module. - Contents can be modified 3 times within 24 hours after being posted (three-revert rules) Policies and rules can be modified by	It is possible to prevent unnecessary debates, to control quality in advance, and to set up rules through consensus.

			participants' consensus.	
		Output Evaluation	Participants' group evaluation on the quality of contents - Participants' consensus drawn by discussion - Decision made by voting - Continuous editing and modification based on peer review Intrinsic reward for the contribution to public interest	The quality evaluation improves the quality of contents.
		Monitoring & QC	Self-correction based on participants' continuous editing - Others' writings may be edited Self-monitoring based on participants' consensus - Continuous management based on repetitive discussion - The administrator is elected by participants' voting The editing phase is recorded in the history page. The Wikipedia scanner program prevents intentional participation. Contents, judged to be Vandalism, are deleted, and the IP is blocked off.	The quality of contents is improved. Self-purification based on decentralized control structure The blocking policy improves participants' activities, in accordance with the guidelines on standard practice.
Naver Knowledge iN	Hierarchy	Submission	Formalization at the level of a memorandum - Smart editor Quantitative data that is saved in closed service - The hyperlink of external data is restricted. - Possible Functions that Writers' IDs are not opened, and data may not be collected. - Writers' information (ID, post, picture and URL) are recorded in their name cards. Outputs are produced by individuals' contribution, without their consensus.	It is advantageous to increase data quantitatively. The contents are more likely to be used for commercial purpose, which may reduce the quality.
		Output Evaluation	The best answer is chosen by the questioner's subjective judgment but by the level of contribution. - The questioner chooses an answer and gives points. The evaluation is focused on each of participants, not contents. - The point is accumulated according to how much the participant has contributed. - Participant's grades vary depending upon the number of answers and the rate of chosen answers.	Participants are rewarded for their individual contribution but for their writings. As contents are not evaluated, the quality may be reduced.

			Reward system to attract more participants. -In addition intrinsic reward, points are given to questioners and answerers. - High-performance participants may be appointed as honorary intellectuals.	
		Monitoring & QC	Ordinarily, contents are reviewed by administrators at the business(Naver). - Contents, going against rules (profit, obscenity, slander, copyright, etc.), are deleted unconditionally, and the points are deducted (disciplinary feedback). Errors are reported from participants to the administrator.	There is no self-purification system on participants. Direct intervention and disciplinary feedback affect participants' autonomy.

Conclusion

In this study, a comparison was made between Wikipedia and Naver Knowledge iN, typical models of open collaboration-based knowledge production, in order to analyze the characteristics of control governance and the differences in control structure, principal strategies and quality. The followings show the results:

First, Wikipedia is completely open to participants and ensures their autonomy in the process of knowledge production, and at the same time effectively controls the quality of contents by using the systematic mechanism based on consensus.

At the entry phase, both of them are open to the public without special authentication. But at the transaction phase, Wikipedia is still open to the public, whereof contents may be modified and improved by participants' consensus. In the case of Naver Knowledge iN, however, answers chosen by questioners, namely final outputs, are kept intact unless they are against operational rules. Thus, it does not allow participants to share their opinions or select writings or purify contents. In other words, there is no collaborative consensus as a critical control mechanism in Naver Knowledge iN.

As regards formalization for ensuring autonomous participation, Wikipedia has rules relevant to markup language and template, which ensure participants' communication and autonomous participation, but at the same time maintain the quality of contents.

In Wikipedia, posted contents are subject to the peer review. And, the quality of contents may be continuously monitored and improved by participants. But in Naver Knowledge iN, writers are subject to the peer review. Their levels are judged as to point and grade gained by questioner's subjective choice, and so contents itself may not be changed in quality.

Second, Wikipedia has the decentralized control structure that enables participants to evaluate contents and make decision. On the other hand, Naver Knowledge iN has the hierarchical control structure in which the administrator, operated by business directly, intervenes directly or indirectly.

In relation to participants' authority, Naver Knowledge iN grades participants as to point in order that they may aggressively participate. Wikipedia allows anyone to participate, and its administrator and arbitrator are elected by participants' voting. Moreover, internal policies may be modified by mutual consensus. In Wikipedia, participants make decision through the consensus-building mechanism, but Naver Knowledge iN does not allow participants to put forth their opinions, but the administrator directly intervenes. Resultantly in Wikipedia, all the participants may participate in every activity, and their contributions are evenly recognized. But in Naver Knowledge iN, participants' contributions are recognized on reference to their points.

Third, difference of control structure is also affected by basically different purposes. As stated repeatedly, Wikipedia is an on-line encyclopedia. Right knowledge is crucial for an encyclopedia, and involves continuous counsels and debates. Therefore, its contents are described by objective facts and opinions. In the case of Naver Knowledge iN, on the other hand, it is not certain that answers are right all the time. Instead, it provides experiential information as much as possible. So, many answers are given to one question, which include abstract knowledge, subjective

counsels, opinions and know-hows. Altogether, Wikipedia participants make much of public interest, knowledge sharing and intrinsic reward. However, Naver Knowledge iN participants get intrinsic reward by satisfying questioner, and at the same time get extrinsic reward by getting points and being upgraded. In particular, the two are remarkably different in control structure. Naver Knowledge iN controls participants' activities by means of disciplinary feedback, but Wikipedia focuses the improvement of participants' activities by means of standard guidelines.

The framework, suggested in this study, was applied to the analysis. The two services allow autonomous participation without special screening at the entry phase, but they were different in control structure. Wikipedia and Naver Knowledge iN aim at an on-line encyclopedia and Q&A services respectively, and thus it is natural that they are different in contents and motive for participation. Even so, it needs to analyze their different control structures. In the case of Wikipedia having the decentralized control structure, the quality of contents is improved with time though the administrator does not control. But in the case of Naver Knowledge iN having the administrator-centered hierarchical control structure, the quantity of contents increases with time, but the problem is that the quality is reduced.

This study is significant in the sense that an empirical study was conducted with the concept of control governance, unlike previous studies focused on the knowledge production mechanism based on participants' characteristics, motive factors and collective intelligence. In addition, this study analyzed the mechanisms for screening and evaluating control governance, as well as analyzed the difference in quality caused by different operational strategies.

From the viewpoint of business practice, this study suggests the framework useful to set up control governances in respective collaboration patterns, which enables businesses to effectively carry out open collaboration-based production strategies. In conclusion, this study is expected to formulate control governance strategies for collaborating with many and unspecified external participants.

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