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**INTELLECTUAL CAPITAL AND PRODUCTIVITY:  
IC MANAGEMENT AS SUPPORT FOR FINANCING  
INNOVATION IN SMES**

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## Intellectual Capital and productivity: IC management as support for financing innovation in SMEs

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**Abstract:** SMEs face severe difficulties in accessing the external financing that supports their innovative activities. One important reason for this is that the innovative capacity of most SMEs is extensively based on intangibles and that there are no international or national standards for reflecting the value of these. This means that financial institutions are reluctant to include them in their risk analyses. The objective of this paper is to show how both SMEs and financial institutions can benefit from using a commonly agreed Intellectual Capital report for financing innovation activities. The paper is based on the results of 9 case studies with SMEs from various sectors, in which we partially applied the InCas (Intellectual Capital Statement made in Europe) methodology, developed within the 6th Framework Programme and a survey respondent by 142 companies. The interviews enabled us to obtain information on 14 selected intangibles, regarding: a) their impact on each company's results; b) company satisfaction with both the quantity and quality of their stock; and c) the degree of systemized management taking into account the 48 indicators proposed by the InCas methodology. In parallel to this process, we conducted interviews with 5 Spanish financial institutions, both public and private, in order to assess the importance that each of the 48 intellectual capital indicators has for their risk analyses. The results from the case studies, tested with the survey, show some interesting conclusions regarding: 1) how useful the methodology is for a company's internal management and as a complement for a financial institution in its risk analysis; 2) the patterns followed by intangibles management in the studied SMEs and its consequences. As a final important conclusion, the study also shows that managing intangibles pays off in terms of productivity.

**Keywords:** Intellectual capital; intangibles; innovation; knowledge management; services.

### Introduction

The existence of a positive relationship between innovation, competitiveness, and economic growth has been widely recognized and, as a result, in recent decades, fostering innovation has become pivotal to many national and international policies. Determining why some companies are more innovative than others, which are the contextual factors that promote an innovative climate, or detecting the barriers that firms have to overcome to innovate, are key questions that we need to solve if we are to develop effective and efficient policies.

Lack of financial resources has been highlighted in many studies (COTEC, 1999; Galia and Legros, 2004; Iammarino et al. 2009; Savignac, 2008) as being among the main barriers that companies face when trying to innovate and the current financial crisis has made matters worse. A recent study (Sánchez and Salazar, 2010) showed that the reluctance of Spanish financial institutions to finance innovative projects is linked to the difficulty of most firms, especially SMEs, to show their innovative potential and their capacity to transform it into economic results. Since the majority of their assets are of an intangible nature and, as a consequence, not reflected in the company's financial information which is released periodically, financial institutions cannot use it as input for their risk assessments.

There is no question of the key importance of intangibles such as human resources capabilities, organizational know-how, technological knowledge, contacts with clients and providers etc, for the innovative potential of a company. However, the value of these

intangibles has, as yet, not been adequately measured and reported in the Balance sheet or in the Profit and Loss Account. This failure can cause serious distortions both in capital markets and company management (Cañibano et al. 2000; García-Ayuso, M. (2003)

The first aim of this paper is to test the possibility of obtaining relevant information on the key intangibles in SMEs, and to contribute to the definition of an Intellectual Capital Statement that is useful both for the internal management of intangibles in a company and for external diffusion. Accordingly, the document, which would complement current financial statements, would enable financial institutions to make investment decisions based on more reliable and thorough information than is currently available. For this purpose, agreement must be reached on the usefulness of the document itself and the mutual interests of the companies and financial institutions. For this reason, the study not only includes SMEs, mainly from the Madrid region, but also 5 public and private Spanish financial institutions. The second aim is to test whether IC management pays off in terms of productivity.

The paper is structured as follows. First, we present a short overview of the framework that supports the subject of our study, linking our research questions to the calls of diverse international institutions. Then, we define the objectives and methodological steps and thirdly, the main results obtained. We finish with some conclusions.

## **1. Intangibles and innovation in the international framework**

The central role intangibles play in generating innovation and economic growth has been widely acknowledged. In fact, the OECD (2010a,b) points out that investment in intangible assets and increased multifactor productivity have been responsible for more than two thirds of the growth in work productivity in many OECD countries. What is more, some studies show a positive correlation between these two factors (Hao et al., 2009), proving the key importance of intangibles as a trigger for growth. Backing up these findings is the World Bank which estimates that investment in these assets is the main source of wealth. All this has triggered an interest in the analysis, measurement and management of intellectual capital and in the management of knowledge, not only within academia, but also in the policy arena. Two recent examples of the increasing interest in measuring intangibles are the “World Intellectual Capital Initiative” (WICI- [www.wici-global.com](http://www.wici-global.com)), a network of university teachers, financial analysts and institutional representatives, and the “International Integrated Reporting Committee” that aims to create an “Integrated Report” showing company assets and actions, and explaining how it creates value ([www.theiirc.org](http://www.theiirc.org)).

The OECD has showed great concern for the micro- and macro-economic analysis of intangibles since as far back as 1988, developing diverse studies and reports (e.g. OECD, 1992, 2002), and holding international conferences (e.g. in Amsterdam 1999, or in Ferrara 2005). In keeping with this interest, the last edition of the Oslo Manual (OECD, 2005) was an especially relevant milestone, since it recognized the importance of non-technological innovation, which is closely intertwined with investment in intangibles. In 2010, the OECD renewed its interest in these issues, launching a new project titled “New sources of growth: intangible assets”. The objective of this project, whose results will be made public in February 2013, is to advance in the development of adequate measurement mechanisms, to broaden understanding of the nature and dynamics of intangibles, and to create policies that incentivize investment in them.

The European Commission, concerned about the distance still separating Europe from competitors such as USA, has also given more importance to innovation policies,. The insufficient investment in human resources (e.g. education, mobility), R&D, or infrastructures, and the difficulties for many innovative companies to access financing, are serious problems that lie behind this under-performance (EC, 2009). As is widely recognized, financing innovative SMEs is usually more difficult in any case (EC, 2010a: 24), but with the effects of the current financial crisis these companies, which make up 99% of the productive fabric of the European Union, have been even harder hit. With these challenges in mind, the European Commission has launched an initiative, the Innovation Union, in which innovation is pivotal to Europe 2020 strategy (EC 2010b: 2). This initiative recognizes that a framework should be

created that answers the specific needs of SMEs, and the increasing importance of non-technological innovation, which is especially relevant to service companies.

The distances separating EU countries regarding innovation are also of concern to the European Commission. The case of Spain stands out especially: not only because its innovative performance and rhythm of growth are below the European average, but also because it is highly heterogeneous, with performance levels varying considerably from region to region (EC, 2010a: 16). In this regard, the Commission emphasizes that it is vital to improve the individual performance of each member country, by developing instruments that both cover the mentioned deficiencies, eliminating the barriers that hinder financial resources, and also foster private investment in R&D and innovation (EC 2010b).

Developing new standards and regulations is indispensable and, to avoid possible negative effects (Walz, 2007), it is important that they are based on rigorous studies.

## **2. Objective of the study and methodology**

In recent decades numerous proposals have been made to bridge the serious information gap in current accountancy systems that do not satisfactorily assess the value of intangibles (Lev, 2001; Amir et al. 2003; Cañibano y Sánchez, 2004). As a result, different mechanisms have been suggested to assess and value companies' strategic intangibles (e.g. Kaplan and Norton, 1992; Sveiby, 1997; Edvinsson and Malone, 1997). The Intellectual Capital Statement (InCaS), developed within the European Commission's 6th Framework Programme by a number of institutions and led by the Fraunhofer IPK Institute, is another example of these intellectual capital assessment models.

As already outlined, the objectives of this paper are to test whether SMEs can elaborate information on their intangibles that clearly reflects their quantity, quality and the degree of management, and test whether IC management has any effect on the company's productivity. We have addressed the following research questions:

- What are the main intangibles that companies manage? Are all the intangibles managed as systematically as one another? How efficient is this management?
- What kind of information on intangibles would financial institutions need if they were interested in financing innovation projects without tangible support?
- Is there a correlation between the management of key intangibles and productivity?

In this paper, our intention is also to go some way towards meeting the recommendations posed by international organizations, mentioned in the previous section. Specifically, we believe that this exercise addresses the following key recommendations:

- a) Creating new instruments that bridge existing financial gaps, with an emphasis on innovative SMEs.
- b) Developing an instrument useful for the internal management of innovation in companies in diverse sectors.
- c) Developing a common language for firms, financial institutions and public organizations that will allow a value to be put on the intangibles of those companies requiring financing.
- d) Establishing a value creating dialogue between the governmental organisms in charge of developing new innovation policies and public financing of innovation, the private financial institutions and SMEs.
- e) Developing best practices for the assessment of those intangibles that are key to innovation, for example by creating standards.

To address these issues we have combined both qualitative (multiple case study and interviews) and quantitative methodologies (survey). We have also partially applied the InCaS model mentioned above, which was specifically designed to be implemented in SMEs which are the object of our study. Taking into account the business model of the organization, the InCaS methodology enables the firm to rapidly detect the intellectual capital that has a greater impact on value creation. It allows for the assessment of each intangible factor, offering a

visualization of the strengths and weaknesses of the organization, the interactions among factors, and between each of them. It also assesses business processes and strategic objectives and can prioritize actions and projects taking into consideration, for example, their impact on results. The main advantages of the InCaS model for the purposes of this study are the following: 1) it is implemented by formally accredited external experts in collaboration with the companies, thus assuring the quality and trustworthiness of the results, 2) the Intellectual Capital Statement (ICS) that stems from the implementation of the model is verifiable by the IPK institute so the value of the exercise and its credibility is enhanced, for example, for financial institutions. Among all the possibilities that this model offers, we have selected a few instruments to be applied to the case study companies and the sequential survey, choosing the 14 intangibles (Table 1) and 48 indicators that occur most often in intellectual capital reports.

**Table 1: List of intangibles included in the analysis**

<b>Classification</b>	<b>Analyzed intangibles</b>
Human Capital	<ol style="list-style-type: none"> <li>1. Professional competences</li> <li>2. Social competences</li> <li>3. Employee motivation</li> <li>4. Leadership skills</li> </ol>
Structural Capital	<ol style="list-style-type: none"> <li>5. Internal cooperation</li> <li>6. ICT and explicit knowledge</li> <li>7. Product innovations</li> <li>8. Process innovations</li> <li>9. Management tools</li> </ol>
Relational Capital	Relationships with: <ol style="list-style-type: none"> <li>10. Clients</li> <li>11. Providers</li> <li>12. External collaborators</li> <li>13. Other partners</li> <li>14. Financial sector</li> </ol>

Understanding how a company works and how the different components of its intellectual capital influence its activities requires an in-depth analysis of its values and processes and for this task qualitative methods are recommended (Yin 1994). As a consequence, the first phase of our analysis has consisted of 9 case studies with SMEs from different sectors (e.g. machinery, health, consultancy, logistics, IT, electronics, carpentry) and sizes (from 2 to 150 employees), all located in the Madrid region in Spain.

Between March and June 2011, interviews were conducted with top management in selected companies, which allowed us to measure: a) the *impact* that each of the analyzed 14 intangibles have on the company results; b) the level of company *satisfaction* with the stock and actual state of each intangible; and c) the *degree to which* the 14 intangibles are *systematically managed*. Concerning this last point, we have identified three situations, based on the existence of 48 indicators which correspond to the different intangibles: 1) *systematic management*: the specific indicator already existed or the company had the data to build it easily, 2) *“in mind” management*: company managers had in mind the information on the indicator, and 3) *not managed*: the information was not available or was considered irrelevant.

In order to go into the analysis more thoroughly, the indicators have been classified into the following three groups according to the effort involved in their elaboration: a) *basic indicators*: normally existent, as their calculation is part of the company’s regular activity; b) *intermediate indicators*: their elaboration requires additional effort and awareness of their importance which, in turn, reflects the firm’s interest in the management of intangibles; and c) *advanced indicators*: this group is especially significant because the existence of this kind of indicator shows a high level of intellectual capital management. For each of the analyzed 14 intangibles we have selected one representative advanced indicator. Figure 1 clarifies the proposed classification with some examples.

**Figure 1: Classification of the indicators: Some examples**

<b>Indicators (48)</b>			
<b>Intangibles (14)</b>	<b>Basic</b> Part of regular activity	<b>Intermediate</b> Obtained with additional effort	<b>Advanced</b> Mark of significant effort
<b>HC:</b> Professional competences	Average seniority	Quality of professional competences	Quality of professional competences
<b>SC:</b> Process innovation	Certifications (quality, risks, environment)	Savings obtained with implemented improvements	Quality of the technology applied to processes
<b>RC:</b> Relationships with providers	Structure of providers (new, old, lost...)	Dependency on providers	Satisfaction with client relationships

← **Effort needed to elaborate the indicator** →

In parallel with this process, we have conducted interviews with 5 Spanish financial institutions, both public and private, in order to assess the relevance/usefulness of the intellectual capital indicators for their risk analyses. These interviews have provided key inputs to the study since they have brought to the fore issues regarding the precise information on the projects for which financing is requested. Additionally, we have also discussed the overall results of the study and the value of the proposed ICS.

Finally, to verify the results of the case studies, we launched a survey to a large collective of SMEs, mainly from the Madrid region, and obtained valid responses from 142 companies<sup>1</sup>. Although the questionnaire was sent to various sectors, most of the respondents were service companies, and mainly from small and micro enterprises. The questions concentrated on systematizing the management of the selected indicators, and they had to choose from the 3 options described above (indicator available, managers having the information in mind, indicator not available).

### 3. Results

#### 3.1. Case studies

As already described, the interviews provided information about the impact of and satisfaction with 14 intangibles, for the 9 selected firms. In order to avoid possible bias (Paulhus, 1991; Johnson et al. 2009), we have not analyzed the ratings in absolute terms but from a relative perspective. By doing this, we have considered an intangible to have significant impact on results or considerable satisfaction with the stock when it is rated higher than average for all the analyzed variables in a company.

The analysis of the results shows that the intangibles considered to have a relatively high impact on a greater number of companies are internal cooperation, motivation and product

<sup>1</sup> The survey was sent through diverse business associations. As the same company may be a member of more than one association there could be some overlap in the sample. We have also used a large data base. A great deal of the information of the data base could not be checked in advance and therefore very many questionnaires were rejected by the system. For these reasons, it is impossible to know the precise number of companies to which the survey was sent, but more than 10,000 firms is a reasonable estimate. Taking into account the low rate of replies, the conclusions have to be taken as preliminary so additional confirmation and testing is therefore needed.

innovation. These results are influenced by the sector, size and other characteristics of the chosen companies and, hence, cannot be extrapolated. However, the study confirms that the availability of these data has enabled us to detect the key intangibles for a group of firms, analyze their situation, and make comparisons. Bringing together the analysis of the impact variable and the ratings in terms of satisfaction with the stock of each variable provides an interesting view of the “relative scarcity” of high impact intangibles. For example, in our sample, more than half the 9 companies have highly rated the relative impact of their professional competences and management tools while simultaneously admitting that these intangibles are scarce in terms of quantity or quality. This kind of analysis has been of great value for the internal management of the companies as it has made them aware of their current shortcomings regarding some important intangibles. In addition to this, the exercise also enables interested external parties to compare the firms concerning their “scarcity” of high impact intangibles. A large database with this kind of information could also be useful for innovation policy matters, as it could detect which intangibles are scarce in a larger number of companies and action could be taken accordingly.

The model has allowed us to analyze the companies in terms of the systematic management of their intellectual capital. In our sample, all of them declared that they elaborate (or have the necessary information) more than 40% of the 48 indicators analyzed in this study. These results are not specified in our case study since they cannot be extrapolated but, with this information, the model allows comparisons to be made between companies and can identify those that manage their intangibles more systematically and those that do not.

We have also analyzed whether the degree of systematized management varies substantially if we take into consideration the three groups of indicators; basic, intermediate, and advanced. As was expected, the basic indicators that are systematically managed are more numerous (81%) than intermediate indicators (40%) and considerably more than the advanced indicators (35%) whose management is more laborious. This means that companies more systematically manage the indicators which require less effort to calculate.

Moreover, we have gone further into this analysis by analyzing how efficient the management of the company’s intangibles is. As a result, we can talk about “efficient management” when the intangibles with a high impact on the results of the company are systematically managed, which is proven by the availability of indicators related to the specific intangible. On the other hand, when an intangible is considered of high impact and is not systematically managed we consider it to be at risk. Because of the high correlation between these two variables, we have only focused on the relationship between the impact and the degree of systematized management of the intangibles. Although this analysis could be replicated for all types of indicators, we have only focused on the advanced ones because it is these that best reflect the company’s interest in managing their intangibles.

This information can be used to create an index that allows companies to be ordered according to their intellectual capital management efficiency and could be of interest to financial institutions, as a ranking can be produced (Table 2).

**Table 2: Type of management of the selected intangibles (only advanced indicators)**

<b>C</b>	<b>Systematic management [1]</b>	<b>High impact intangibles [2]</b>	<b>Efficient systematic management [3]</b>	<b>Efficiency index [4]=([1]/14)x([3]/[2])</b>	<b>Ranking [4]</b>
1	5	6	4	0,24	3 <sup>o</sup>
2	7	9	7	0,39	1 <sup>o</sup>
3	2	6	2	0,05	8 <sup>o</sup>
4	3	9	3	0,07	7 <sup>o</sup>
5	6	4	3	0,32	2 <sup>o</sup>
6	1	5	0	0,00	9 <sup>o</sup>
7	5	11	4	0,13	6 <sup>o</sup>
8	8	3	1	0,19	5 <sup>o</sup>
9	5	6	4	0,24	4 <sup>o</sup>

Note: Maximum number of intangibles is 14. The value in column [3] is, by definition, lower or equal to values in columns [1] and [2].

The *efficiency index* is created by two factors:

- f) Proportion of intangibles that are systematically managed (in this case through advanced indicators) ( $[1]/14$ )
- g) Proportion of efficiently managed intangibles, that is, systematically managed among the high impact intangibles ( $[3]/[2]$ )

With the information provided by this index we can say that a company systematically managing a considerable number of its intangibles, but mainly focusing on low impact intangibles (e.g. company 8) is less efficient than one that mainly focuses on the intangibles with greater impact on its results (e.g. company 1).

### **3.2. Financial institutions**

As explained in the methodology, the interviews conducted with the 5 financial institutions have allowed us to evaluate the importance that managing the selected intangibles has for them and for assessing projects in need of financing. To gauge this, each institution rated the 48 indicators on a scale of 1 (little importance) to 3 (great importance).

This exercise enables us to identify the “common ground” between the companies and financial institutions. In other words, to let us see which of the indicators managed by companies are of significant interest to the financial institutions. In this respect there is a particular result that stands out: financial institutions show a greater interest in basic indicators; those that are more easily elaborated and that are available to most companies. Rated lower are the intermediate or advanced indicators, even though these show greater management capabilities.

We find two explanations for this surprising result: first, the information that is currently available to and used by financial institutions is what the companies more usually provide; and, second, financial institutions perceive that the intermediate and advanced indicators are less reliable.

These results indicate the need for standardized measurement and assessment methodologies that would provide verifiable information about the more advanced indicators, since these are the ones that better reflect the efficiency and effort the company makes to manage its key intangibles. It is also worth noting that the financial institutions have showed special interest in a company's ability to present disaggregated information on their intangibles for the specific innovation projects that require financing.

### **3.3. Survey**

In order to verify the results of the case studies, we have launched a survey to a larger sample of SMEs.

Through this survey, we have obtained the percentage of companies that systematically manage each of the 48 indicators and have separated them from those more generally managed. Our results range from the firms' systematic management of 94% of the indicators of employee qualifications and training, to only 33% of indicators for satisfaction with relationships with investors or financial institutions. These results show that classifying the 48 indicators into the three groups (basic, intermediate and advanced) is closely correlated with the level of management; the indicators situated in the upper quartile (more generally managed) are mainly basic indicators while those in the lower quartile (less managed) are mainly advanced.

Besides these findings, the survey has also enabled us to relate the company's level of intellectual capital management with its productivity, estimated in terms of business volume per employee. Analyzing the results has given us some interesting insights: the higher the intellectual capital management level, the more likelihood of the firm having higher



productivity levels than average for its sector. In other words, companies that elaborate more advanced indicators are more likely to reach better productivity levels.

The relationship between these two variables, systematic intellectual capital management and success (productivity higher than the sector's average) is formally shown by the Pearson (r) correlation coefficient (Table 3). The r-values indicate that the availability of basic indicators is in no way related to business success while, on the other hand, available intermediate and particularly advanced indicators positively correlate with this success.

**Table 3: Correlation between systematic management and business success**

Type of indicator	Correlation coefficient (r)	P-value
Basic	0,051	0,3896
Intermediate	0,141	0,0839
Advanced	0,197	0,0010

These results allow us to answer the question as to whether there is a correlation between the management of key intangibles and productivity. However, the reduced *r-values* obviously mean that the success and productivity of the analyzed companies depend on many additional factors and not only the management level of their intellectual capital (e.g., size, sector of activity, etc.). Therefore, in order to learn more about the importance of the systematic management of IC in business productivity, we conducted an econometric analysis whose main results are summarized below.

The quantitative analysis is based on a sample of 142 firms, most of which are small (fewer than 50 employees) from the service sector (see Table 4).

Table 4. Distribution of the sample

Sector	Size		
	Small	Medium	Large
Industry	28	0	0
Services	101	7	6

The model used in the analysis is as follows:

$$Y = b_0 + b_1L + b_2G + b_3s_1 + \dots + b_{k+2}s_k + \varepsilon$$

where  $Y$  is the relative productivity (or business success), measured by the difference between the productivity of the firm (turnover per employee) and industry average productivity;  $L$  is the number of employees;  $G$  is the index of systematic management of IC (contained in the interval  $[0,1]$ );  $\{s_1, \dots, s_k\}$  are  $k$  dummy sector variables (constructed using two-digit CNAE-2009 classification),  $b$ 's are the parameters to be estimated by the model, and finally,  $\varepsilon$  is a vector of *iid* disturbances. This model can be estimated by OLS.

Set out below are the two hypotheses guiding the analysis:

*Hypothesis 1.* There is a direct relationship between the systematic management of IC, measured by Advanced indicators, and business success.

*Hypothesis 2.* Unlike the case of Advanced indicators, there is no significant relationship between the management of intangibles, measured by Basic indicators, and business success.

We tried different specifications for the model, using the variables described previously, to analyze the stability of the explanatory power of IC management indicators. Table 5 shows five alternative specifications (in order to simplify presentation, the results for dummy sector

variables are omitted, and only the information regarding whether they were used or not, is in the model provided).

Table 5. Results

Explanatory variables	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	t	b	t	b	t	b	t	b	t
C	-0,111	-2,89	-0,123	-2,51	-0,207	-2,93	-0,165	-1,87	-0,187	-2,10
Size	-	-	0,005	0,39	0,003	0,21	0,007	0,45	0,000	0,00
Advanced indicators	0,155	2,38	0,155	2,37	0,160	2,21	0,211	2,20	-	-
Basic indicators	-	-	-	-	-	-	-0,112	-0,81	0,087	0,82
Dummy sector variables in the model	No		No		Yes		Yes		Yes	

Given these results, we accept hypothesis 1, which states that there is a direct relationship between the systematic management of IC and business success, with a confidence greater than 95%. This is because the t-statistic associated with Advanced indicators (see Table 5) is, in all models where this variable appears, greater than 1.96 which is the critical value for this level of confidence. This result allows us to say that the use of Advanced indicators reduces uncertainty regarding the probability of business success.

On the other hand, following the same line of argument used in the previous paragraph, we cannot accept the hypothesis that Basic indicators are significantly related to business success.

### Conclusions and relevance of the research

This research throws valuable light on the impact that managing intangibles has for SMEs. In this respect, the companies used in the case study stated that the exercise had helped to detect areas in need of improvement. In addition, it is also interesting to see that there is a correlation between the systematic and efficient management of intangibles and business success.

Moreover, this kind of exercise has been proven useful as a complement to current financial reports by providing valuable information on intellectual capital. The resulting IC Reports could be a useful guide to financing innovation activities and with the methodology, which allows an index of IC management efficiency to be developed, financial institutions could find it of great interest.

Last but not least, the exercise can contribute to the development of policies that foster investment in intangibles, as it creates a dialogue between financial institutions and SMEs whose aim is a final document useful to both actors. If partially implementing the model has already proven useful, we believe that applying it integrally would be even more interesting for all the parties involved.

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