

THE NEXT SOCIETY

INNOVATORS
SHAPING THE FUTURE
IN THE MEDITERRANEAN

TOWARDS THE CREATION OF AN EU-MED
REGION INNOVATION SCOREBOARD
BACKGROUND NOTE

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Introduction

Innovation plays a crucial role in the economic and social development. It is an important driver of growth, productivity, competitiveness, and job creation. Innovation can also help addressing some of the socioeconomic challenges like health and poverty. In order to enhance policy development and innovation implementation, the first step is to have a clear definition of what is innovation.

Being a multidisciplinary topic, it comes at no surprise that there exist more than 40 definitions of innovation. For the purpose of our work we focus on the economic innovation. The most commonly used definition in this domain is the one made in the third edition of the Oslo Manual and which defines innovation as follow: "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations." Different international organisations added to this definition to broaden it and make it more inclusive. (See Annex I for more details).

All definitions agreed that innovation is more than activities of R&D and publishing articles in refereed journals. As argued by the Global Innovation Index (2014) "innovation has a more general and horizontal nature, and should account for social innovations and business model innovations as well as technical ones."

1. Measuring Innovation: Innovation scoreboards.

As innovation is a collection of a large number of aspects and variables, measuring it cannot be done with one variable or indicators, but a collection of indicators, which are called a Scoreboard.

Innovation scoreboards summarise different types of indicators that are related to the innovation process. Scoreboards are often used to compare the innovation performance among countries, region or sectors. Scoreboards could include values or rankings of several indicators; they could include profiles of countries/regions and could also include benchmarking against an average, best practice and/or others. Broadly, they could be useful for comparative purposes.

1.1. Some problems with existing Innovation indicators:

1. It is to note that among those existing internationally used indicators, only a few include a worldwide coverage. This is clearly due to the lack and difficult of obtaining data, particularly in developing countries.
2. For the South Med Region, only selected countries are covered in some of the International Innovation Scoreboards, such as the Global Innovation Index (GII) and innovation indicators of the World Competiveness Report (WCR). Only recently Egypt and Israel have been included in the OECD published Science, Technology and Innovation outlook.
3. Moreover, it is argued that the indicators included to measure innovation were mainly designed for the developed and emerging markets' economies and hence are not able to give a real picture of the progress and the challenges for the developing countries, especially when benchmarked to the progress achieved by the developed ones.
4. Existent Scoreboards and innovation indicators have not been adapted to reflect the progress (or lack of) of the innovation in the South Med countries. Scarce financial resources, limited market access, distorted macroeconomic balances and unfavourable business environment, in the presence of abundance of

human capital, could mean for the South Mediterranean countries a closed circle of limited progress, unemployment and stagnant economies.

1.2. Which Innovation scoreboard for the South Med region?

Innovation scoreboards need to take into account the different challenges that the counties are facing. Macroeconomic, institutional, instability, business environment, human resources are some of the important challenges faced by the South Med region and need to be taken into account.

For instance, in most of the South med countries there is a serious problem of access: access to knowledge, infrastructure, internet restrictions, electricity shortage, etc. that needs to be included differently (e.g. rather than measuring the number of domains per 1000, to measure the increase in the number of domains from one year to the other). Also there are issues related to the institutional bureaucracy (business start-ups, access to credit, procedures of setting up a business, etc.), and instability (political, economic social).

Also, expenditure on R&D in the region is considered one of the lowest compared to other similar region and the quality of the research produced is still also low compared to the available number of scientists (e.g. engineers, scientists, etc.). In addition, there is a huge skills' mismatch between what is needed to develop an innovation process (either in public or the private sector) and the actual graduates' specializations. Moreover, most of the manufacturing in the region are labor-intensive sectors and use low or low to medium technologies.

A new survey on the business environment in MENA region conducted by EBRD in six South Med countries in 2013 (more than 4,400 firms) shows that political instability (highest challenge in Egyptian and Tunisian surveyed SMEs), access to finance (highest in Jordanian SMEs), corruption and competitors' practices in the informal sector (highest in Moroccan SMEs) are the most significant constraints faced by enterprises. While the survey is not focusing on innovation, per se, but it did give some indications on the challenges that the firms in this region face. The data showed that most innovation done by the firms are not ground breaking but mostly focused on improving existing products to adapt to markets' needs or upgrading machinery.

In a nutshell, the South Med countries are currently suffering from poor innovation systems. According to the 2015 GII index, the highest scoring countries in the region, excluding Israel who is among the high achievers worldwide (0.85), are Lebanon (0.48), Jordan (0.47), Tunisia (0.46) and Morocco (0.45), while Egypt (0.29) and Algeria (0.11) are at the bottom two.

Given this, and while taking into account the advantages and disadvantages of the existing innovation indicators, FEMISE has created a Scoreboard of innovation, that could bring in some of the particularity about the region while shedding light on the progress (or lack) achieved so far.

2. Towards a South Med Innovation Scoreboard

Our starting point towards creating the South Med Innovation Scoreboard was to look at what other organisations have done and to assess their list of indicators. Ranging from well-known scoreboards, such as the Global Innovation Index (GII), the Innovation Pillar in the Global Competitiveness report (GCR), the OECD reports, the EU innovation scoreboard to regional innovation analysis (e.g. ESCWA) and national domestic reports and papers.

Assessing these scoreboards lead us to: select some of the indicators that were most adapted to the region, include some other indicators with a twist, such as calculating a growth rate or a proportion to provide relativity (rather than using the absolute value), and added new indicators that have not been explored before but, that through our readings seem to add an important dimension to the region.

2.1. Innovation indicators data

As expected, one of the most important challenges that we faced in this process is the availability of data, especially when looking into across the region data (which means data that could be comparable across the region). As a rule we set ourselves, if an indicators is not available for more than 3 out of the 7 countries we are covering than this indicators will not be used in the regional scoreboard. This has eliminated some indicators but we found ways of finding proxies that could provide the same impact or by providing our own calculation from raw data

The data included in the scoreboard includes:

- 1- Published data (secondary data) by international organisations
- 2- Survey data (primary data) that was conducted by different organisation (such as the World Bank doing business and enterprises surveys)
- 3- Calculated data from raw database (such as the ones provided by UNIDO).

It is also important to note that some of the indicators that are often considered as an 'input' to the innovation process in developed countries' scoreboard, are considered here as an "output" to the innovation. This is because our initial research indicated that some of these indicators are not well established or very low performance in our region. For example, the number of scientific publications (per million persons), which, in our opinion, is an output of the innovation process and not an input (considered as an "enabler" in the EU scoreboard).

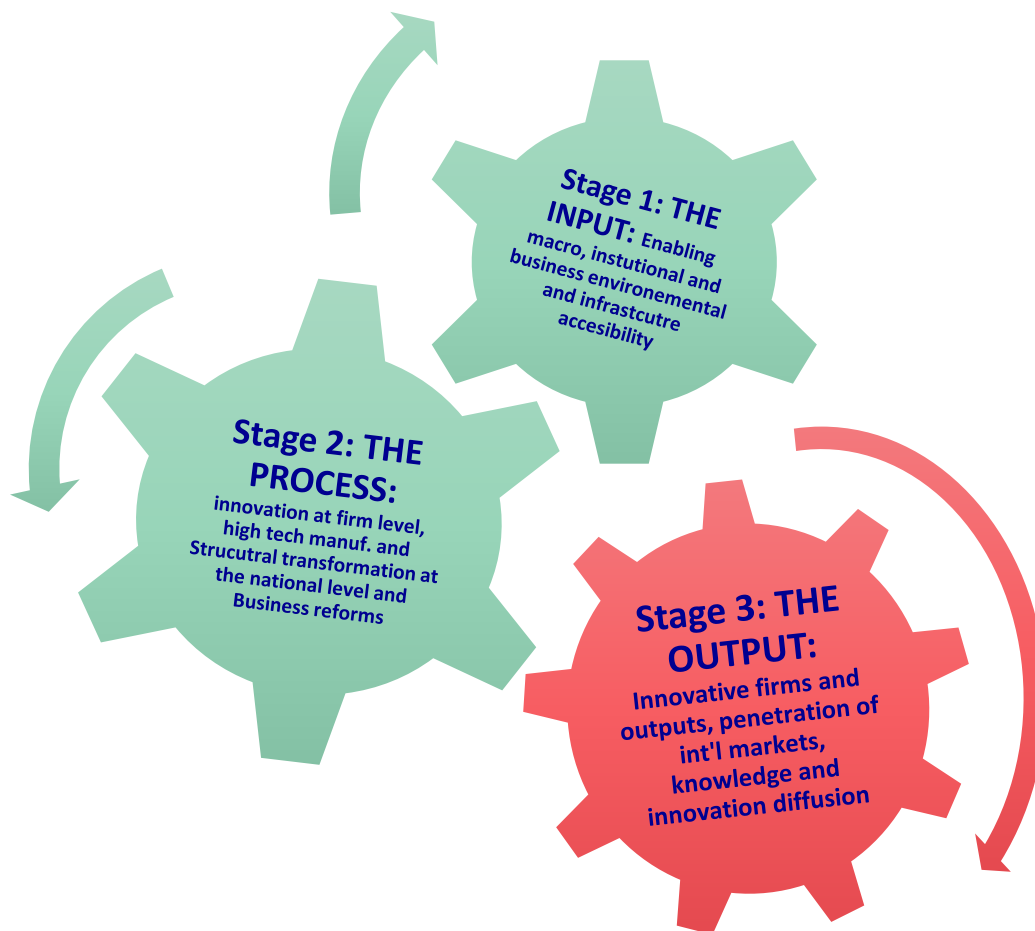
The total number of indicators included in the scoreboard is 68 indicators and all data included have been referred with its source.

2.2. The Innovation Process

The "innovation process" goes through 3 stages:

- (I) The Input stage: this is where the basic 'ingredients' of reaching an innovation system are put in place. This stage includes indicators related to the Enabling environment, human capital investment and Research and development.
- (II) The Process stage: this is where all those ingredients work together in a defined environment: benefiting from opportunities and facing challenges. This stage includes indicators related to the use of advanced technology and awareness of the importance of training and R&D at the firms' level, the level of high tech in the industry and the structural transformation at the national level, in addition to the adoption of business reforms.
- (III) The Output stage: this represents the outcome of the innovation process and the different channels through which the innovative product or idea are diffused. This stage includes indicators related to the Innovative firms and their outputs, the performance of innovative products in the international markets and the degree of diffusion of knowledge and innovation.

The following diagram explains how the innovation process is considered in the Scoreboard.



As mentioned above among the 68 indicators in the scoreboard, some have not been used in any other scoreboards. One example in an indicator in the “process phase” about the degree of structural transformation for the economy, this was measured by the ratio of the industrial and services sectors in the GDP (the highest the ratio the more advanced the economy in its ST). This indicator gives a suggestion of the type of economy this innovation process is processed in. Another example in the same phase is the ratio of positive business laws/reforms compared to the number of reforms since 2010. This information provides again an indication of what type of institutional progress is surrounding the innovation process: an encouraging pro-business environment is indicated by a high ratio. A third example is the use of Export Market Penetration Index in the output phase. This index is calculated by the World Integrated system and measures the extent to which a country’s exports reach already proven markets. We found it good proxy to measure the quality and creativity of the products exported.

2.3. List of Potential innovation indicators:

For each of these stages, the list of indicators below, provides a collective way to measure this stage. Of course the list is not exhaustive and can be revisited, with new indicators, modifications of indicators, etc.

Stage 1: THE INPUT

1. Enabling Environment

1.1 Political and Institutional Environment

Political stability and safety
Government effectiveness
Regulatory quality
Rule of law

1.2. Economic, Labour and Business Environment

GDP per capita growth (annual %)
GDP Growth Rate (Annual %)
Foreign direct investment, net inflows (% of GDP)

Time required to start a business (days)
Time required to start a business (days)
Difference in time required to start a business between 2005 and 2016(days)
Cost to start a business (% of Gross National Income per capita)
Ease of starting a Business
Ease of getting credit

Unemployment, youth total (% of total labour force ages 15-24) (modelled ILO estimate)
Brain Drain: Capacity of the country to retain its talent

1.3. Infrastructure

Number of Internet users per 100 population
Growth rate of number of internet users per 100 Pop
Mobile cellular subscriptions (per 100 people)
Growth rates Mobiles users (per 100 population)

Households with Computers (% of total households)
Households with Internet Access (% of total households)

Access to electricity (% of population)
Access to electricity, rural (% of rural population)
Electricity production from renewable sources, excluding hydroelectric (% of total)
Time required to get electricity (days)
Investment in telecoms with private participation (% of GDP)

2. Human Capital

2.1 Resources for Education

Government expenditure on education as % of GDP (%)
 Government expenditure per secondary student (constant US\$)
 Government expenditure per secondary student (% of GDP per capita)

2.2 Quality and commitment to education

Gross enrolment ratio, tertiary, both sexes (%)
 Percentage of students in tertiary education enrolled in either Engineering, Manufacturing and Construction programme or Science programmes, both sexes (%)
 Percentage of all students in tertiary education enrolled in ISCED 7 & 8, both sexes (%)

School life expectancy, primary to tertiary, both sexes (years)
 Percentage of graduates from tertiary education graduating from Information and Communication Technologies programmes, both sexes (%)
 Percentage of graduates from tertiary education graduating from Engineering, Manufacturing and Construction programmes, both sexes (%)

PISA: Mean performance on the reading scale
 PISA: Mean performance on the science scale
 PISA: Mean performance on the mathematics scale

Pupil-teacher ratio in secondary education (headcount basis)

3. Research & Development

Gross Domestic Expenditures on R&D (GERD) (PPP adjusted and as % of GDP)
 Number of Researchers in R&D (per million people)
 Researchers per thousand labour force

Charges for the use of intellectual property and patents (BoP)
 University-industry collaboration in R&D, 1-7 (best)

Stage 2: THE PROCESS

1. At the Firm Level

Ease of doing Business (DTF)
 Percent of firms using technology licensed from foreign companies
 Percent of firms having their own Web site
 Percent of firms using e-mail to interact with clients/suppliers
 Percent of firms that introduced a new product/service
 Percent of firms whose new product/service is also new to the main market
 Percent of firms that introduced a process innovation
 Percent of firms that spend on R&D
 Percent of firms with an internationally-recognized quality certification
 Firms offering formal training (% of firms)
 Proportion of skilled workers (out of all production workers) (%)

2. At the National Level

Annual labour productivity growth (%)

New business density (new registrations per 1,000 people ages 15-64)

No. of firms classified under high Tech and Medium to High Tech at ISIC classification (as percentage of classified firms)

Degree of structural Transformation (Value added of Industry and Services Sector as % of GDP)

3. At the legislative and policy levels

Net Number of positive and negative Business reforms /Total reforms since 2010

Stage 3: THE OUTPUT

1. Innovative firms and outputs

Internationally-recognized quality certification (% of firms)

Output of firms classified under High Tech and Medium to High Tech as per OECD ISIC classification (as % of output)

Number of ISO 14001 environmental Management Certificates

Number of ISO 9001 quality Management certificates

2. Innovative products in International Markets

High-technology exports (% of manufactured exports))

ICT service exports (% of service exports, BoP)

Computer, communications and other services (% of commercial service exports)

Export Market Penetration Index

3. Knowledge and Innovation diffusion

Published Documents per million of population

Number of Citations per million of population

Citations per document

Growth in total number of patents' applications (resident and non-residents)

Number of Patents' Residents applications per million population (by origin)

Growth in total number of trademark applications (direct and via the Madrid system)

Number of trademark applications (direct and via the Madrid system) per million population

Growth in total number of design applications

Number of design applications (direct and via the Hague system) per million population

Industrial design applications, resident and nonresident, by count

Annex I: Innovation and Competitiveness Definitions

Why to define innovation?

Innovation plays a crucial role in the economic and social development. It is an important driver of growth, productivity, competitiveness, and job creation. Innovation can also help addressing some of the socioeconomic challenges like health and poverty. In order to enhance policy development and innovation implementation, the latter has to be accurately measured and hence clearly defined.

Definitions

It is important to highlight that innovation is a multidisciplinary concept. Yet, we will focus on the available economic definitions.

Early definitions of innovation

Schumpeter early work (1934) accounted for five types of innovation: new products, new methods of production, new sources of supply of raw materials or semi-manufactured goods, and new ways of business or industry organization.

International Organizations definitions

The European Commission (1995) has defined innovation as “the renewal and enlargement of the range of products and services and the associated markets; the establishment of new methods of production, supply and distribution; the introduction of changes in management, work organization, and the working conditions and skills of the workforce”. In 2003, the Commission has updated the definition to account for the multidimensional nature of the concept as follows “the successful production, assimilation and exploitation of novelty in the economic and social spheres”.

Oslo Manual with its three editions, co-authored by OECD and European Commission, has provided the most comprehensive definition for innovation. Oslo Manual first edition (1992) focused mainly on innovation for manufacturing sector. It has identified tools to measure technological innovation.

The second revised edition (1997) accounted for the services sector and provided an annex on collection on non-technological innovation data. It was clarified that the manual focuses on the firm level. It does not cover other categories of innovation discussed for example by Schumpeter, such as the opening of a new market, the conquest of a new source of supply of raw materials or semi-manufactured goods, or the re-organization of an industry.

Innovation is sometimes viewed too narrowly as technological change. Yet, the third edition from the Oslo Manual (2005) defined innovation as follows: “An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations.” Therefore, this edition expanded the innovation definition to include two new types of innovation which are the organizational innovation and marketing innovation. The definition of this edition reflects the evolution in the way of perceiving the notion of innovation.

This definition implied **four types of innovation**:

- **Product Innovation**, which is defined as “A good or service that is new or significantly improved. This includes significant improvements in technical specifications, components and materials, software in the product, user friendliness or other functional characteristics.”
- **Process Innovation**, which is defined as “A new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.”
- **Marketing Innovation**, which is defined as “A new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.”
- **Organizational Innovation**, which is defined as “A new organisational method in business practices, workplace organisation or external relations.”

OECD Glossary of Statistical Terms is also adopting the same definition as the third edition from the Oslo Manual. The UNESCO institute for Statistics has also addressed these types of innovation in their recent summary Report for 2015 UIS innovation Data collection.

Inspired by Schumpeter’s definition, a World Bank report (2009) has defined innovation as follows: “innovation can be regarded as consisting of (1) new products (material goods and intangible services), (2) new processes, (3) new ways to penetrate new markets, (4) new supply sources or distribution methods, and (5) new industries. In addition to these five categories, the use of new management practices and organization structures, the development and retention of skilled personnel, new ways of securing financial resources, and new ways of managing the interface with government and other external agencies are also forms of innovation. Innovation is therefore the development, commercialization, and application of new and unproven technologies, untested products, and new services, processes, and institutions.”

The Global Innovation Index (2014) has argued that the definition of innovation should be broadened and it should not be restricted to R&D and publishing in scientific journals. It added that innovation has a more general and horizontal nature, and should account for social innovations and business model innovations as well as technical ones.

The relevance of innovation to developing countries is sometimes questioned. International organizations have elaborated definitions for the concept of innovation that are relevant to emerging countries and developing countries as well as countries in transition. Since our study is focusing on seven South-Med countries which are all developing countries, we need to highlight these definitions in particular.

EBRD focused on innovation in its transition report for 2014, with a special focus on firms’ performance in this regard. The report has defined innovation as follows “Innovation has associations with high tech and R&D, but innovation is something much broader and encompasses the introduction of any new products, services or production processes”. The report argued that this definition is suitable for emerging countries since productivity improvements, and hence economic growth, will come from adopting the global available technologies in local markets. Similarly to the OECD Oslo Manual, the report has adopted the following four types of innovation:

- Product innovation: “a category that includes significant improvements to technical specifications, components and materials, incorporated software, user-friendliness and other functional characteristics of goods and services”.
- Process innovation: “new or significantly improved production methods – or, for service-sector companies, delivery methods. Examples of such process innovations include the automation of work that used to be done manually, the introduction of new software to manage inventories and the introduction of new quality-control measures”.
- Organisational innovation: “new approaches to business practices, workplace organisation or external relations. It may seek to improve a firm’s performance by reducing administrative or transaction costs, gaining access to non-tradeable assets or reducing the cost of supplies”.
- Marketing innovation: “Marketing innovations could, for instance, be aimed at better addressing customers’ needs, opening up new markets or repositioning a firm’s product on the market. Examples

include the introduction of a new flavour for a food product in order to target a new group of customers, product placement in films or television programmes, the establishment of client loyalty cards or the introduction of variable pricing based on demand.”

A World Bank report on Brazil (2008) introduced a definition for innovation that accounts for the specificity of developing countries. The report argued that much was expected from developing countries with regards to patents and R&D while they are behind the technological frontier in many sectors. Therefore, the report suggested a broader definition for their case as follows: “(a) creation and commercialization of new knowledge and technology, (b) acquisition of knowledge and technology from abroad for local use and adaptation, and (c) the dissemination and effective application of knowledge and technology (whether domestically created or acquired from abroad) that is already available in-country though not broadly utilized”.

In the same sense, World Bank (2010) has defined innovation as follows: “innovation means technologies or practices that are new to a given society. They are not necessarily new in absolute terms. These technologies or practices are being diffused in that economy or society”. This definition has focused on the dissemination effect, which is important for low and middle income countries. This report has also argued that innovation has the objective of benefiting people, including the poorest. The report also argued that for the particular case of low and middle income countries, the differentiation between low and high technology is not useful. It elaborated that high technology does not necessarily generate jobs and wealth. As for the low technology, it is supposed to lead to significant economic growth and welfare. It also added that the use of high technology could be more profitable than producing it.

The same World Bank report has also highlighted another dimension for innovation. It clarified that innovation is a social process. It initially come from entrepreneurs and depend on the economy’s responsiveness in this regard.

On another related front, it is important to consider the concept of “**Inclusive Innovation**”. World Bank (2013) has defined it as follows “An inclusive innovation is any innovation that helps expand affordable access to quality products and services which help create livelihood opportunities for excluded populations – on a sustainable basis and with significant outreach.” Therefore, this concept includes five main features: affordable access, sustainable production, products and services which create livelihood opportunities, orientation towards excluded communities, and significant outreach.

It was also clarified in OECD (2012) that innovation is related to inclusion because of the following: First, inclusive innovation can provide solutions to reduce inequality between richest and poorest groups in societies. Second, innovation through low and middle income groups can promote entrepreneurship and integrate marginalized groups in economic activities.

In the context of development theory, it is also possible to consider the concept of “**Social Innovation**”. The latter is defined as “a new combination of social practices in certain areas of action or social contexts with the goal of better satisfying or answering social needs and problems than is possible on the basis of existing practices”. The European Commission (2013) has defined social innovation as follows: “the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations. It represents new responses to pressing social demands, which affect the process of social interactions. It is aimed at improving human well-being.”

Another important concept that is directly linked to the innovation is the concept is “**Knowledge Economy**”. EBRD has defined the latter as follows “one marked by technological dynamism, including in those sectors not always associated with cutting edge innovation, such as agribusiness or heavy industry. In order to thrive, the knowledge economy relies on an adequate institutional framework, good education, strong communications infrastructure and a supportive financing environment”.

The linkages between innovation and competitiveness

Competitiveness is also sometimes narrowly defined as change in productivity. The World Economic Forum's Global Competitiveness Report defines competitiveness as "the set of institutions, policies, and factors that determine the level of productivity of a country".

A World Bank Report (2009) has defined competitiveness as follows: "possessing the capabilities needed for sustained economic growth in an internationally competitive environment in which there are other countries, clusters, or firms that have an equivalent but differentiated set of capabilities of their own. Competitiveness also implies a continuing rise in the living standards of individuals that are members of a social group with the required capabilities. Moreover, competitiveness can be regarded as entailing the comparison of relative growth rates or benchmarking of performance to assess how well each participant has done in developing the capacities for innovation and growth, rather than being about the mutual potential for damaging one another".

On the linkages between innovation and competitiveness, the same report has argued that the origin of competitiveness is the locally differentiated capabilities which are essential to sustain growth. These capabilities should be created through innovation. It has argued that there no uniform theory on the linkages between competitiveness and innovation. Yet, the most innovative countries are in fact the most competitive. It has elaborated that for low income countries to be competitive, it should learn foreign technology and its diffusion, and adapt it to local circumstances to meet demand.

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