

Brazilian clothing and textile sectors

Cases of textile recycling enterprises

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7 campi

92,064 students

(58th. undergrad., 28th. postgrad., 6th. specials)

5,860 professors

16,837 staff collaborators



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Graduation (1988), MSc. (1995) and PhD. (2000) in **Chemical Engineering** at Polytechnic School of University of São Paulo. Professor (since 2005) and associated professor (since 2011) in **Textile and Fashion** course at the School of Arts, Sciences and Humanities, University of São Paulo. She previously worked at the Butantan Institute and Rhodia Textile (Rhône-Poulenc group). With emphasis on Textile Technology and Biotechnology, currently her research lines are **Brazilian vegetable fibers** and **textile recycling**.

CV: <http://lattes.cnpq.br/7827852209292889>

BRAZIL



5th largest country in the world (Area: 8.514.876,599 Km²)

5th largest population in the world (194 million)

4th Largest Democracy in the World

7th Largest Economy in the World (Largest in Latin America) – **GDP of USD 2,242 billion**

Largest hydro resources and largest rain forest in the world

1.0% year demographic growth rate

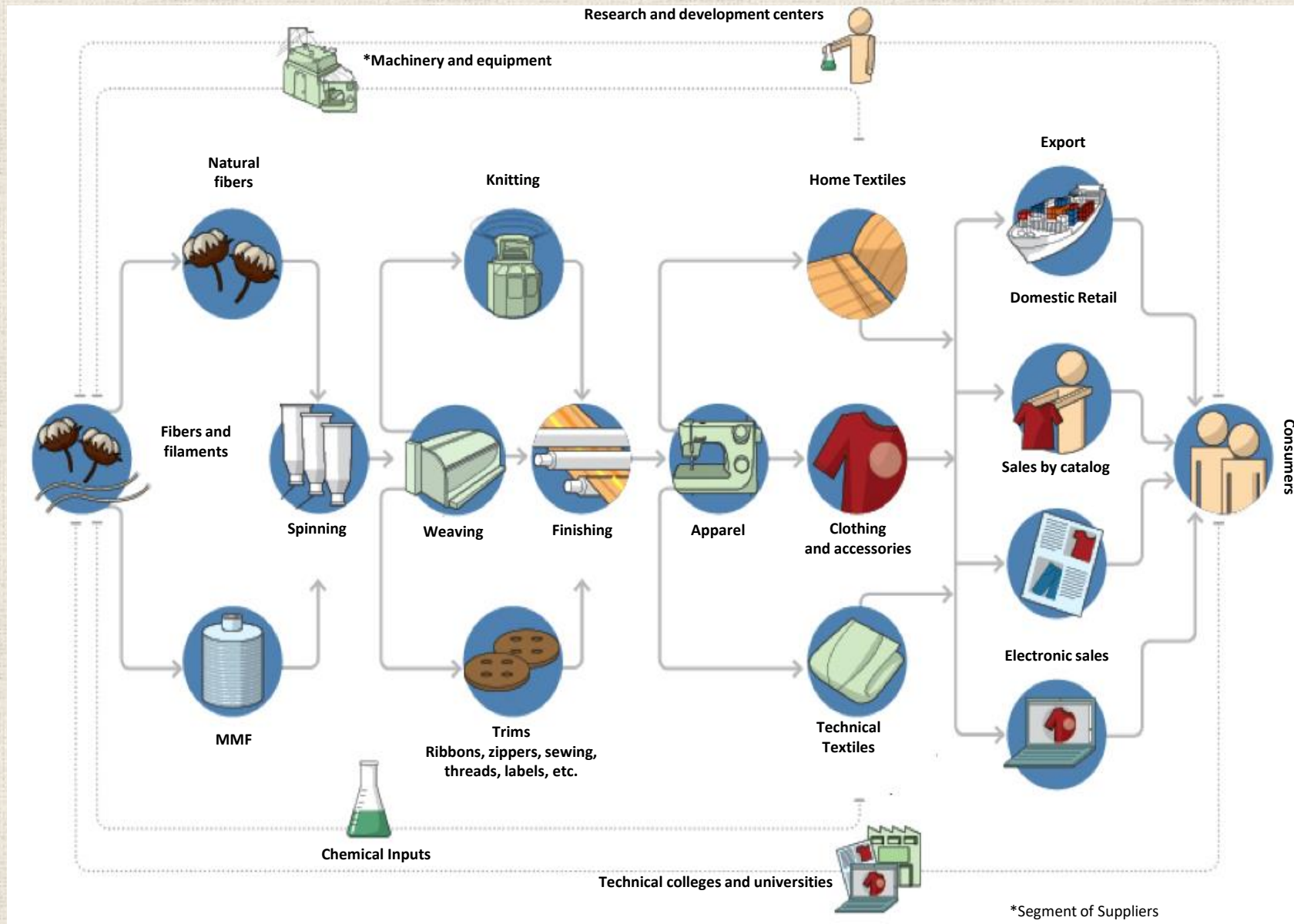
84% live in urban areas

51% are women

51% below 30 years

US\$ 11.5 thousand/year GDP *per capita*

STRUCTURE OF PRODUCTION, DISTRIBUTION OF TEXTILES AND APPAREL



SOURCE: Brazilian Association of Textile and Apparel Industries

ABIT, 2014 (data from 2013 year) - <http://www.abit.org.br>

TEXTILE AND APPAREL SECTOR PROFILE

Textiles

3 thousand industries

275 Thousand jobs

1,9 million tons / year¹

Invoicing of US\$ 22 billion

Exports of US\$ 1.15 billion

Investments of US\$ 980 million²



Apparel

30 Thousand industries

1.4 million jobs

1,2 million tons / year¹

Invoicing of US\$ 43 billion

Exports of US\$ 150 million

Investments of US\$ 620 million²

WORLD PRODUCTION

▶ World production of textiles (Tons)		
	Textiles	Part. %
China	41,461.000	50,2
India	5,669.000	6,9
USA	4,403.000	5,3
Pakistan	2,996.000	3,6
5th - Brazil	2,001.000	2,4
Indonesia	1,952.000	2,4
Taiwan	1,874.000	2,3
Turkey	1,545.000	1,9
South Korea	1,483.000	1,8
Thailand	993.000	1,1
Mexico	759.000	0,9
Bangladesh	663.000	0,8
Italy	636.000	0,8
Russia	516.000	0,7
Germany	448.000	0,5
Others	15,152.000	18,4
Total	82,546.000	100,0

▶ World production of clothing (Tons)		
	Clothing	Part. %
China	22,582.000	47,2
India	3,416.000	7,1
Pakistan	1,497.000	3,1
4th - Brazil	1,258.000	2,6
Turkey	1,216.000	2,5
South Korea	1,003.000	2,1
Mexico	991.000	2,1
Italy	913.000	1,9
Malaysia	684.000	1,4
Taiwan	679.000	1,4
Poland	679.000	1,4
Romania	567.000	1,2
Indonesia	519.000	1,1
Bangladesh	496.000	1,0
Thailand	488.000	1,0
Others	10,840.000	77,3
Total	47,829.000	100,0

SOURCE: IEMI 2013 based on 2011 data apud Brazilian Association of Textile and Apparel Industries

ABIT, 2014 (data from 2013 year)

GENERATION OF SOLID TEXTILE RESIDUES

The textile residues are originated basically from:

1. Textile industry



2. Confection industry



3. Post-consumption



GENERATION OF SOLID TEXTILE RESIDUES

Brazil produces **175,000 ton** of residues from the textile and confection industry per year. However, more than **90%** of fabric residues are discarded incorrectly.

In **São Paulo city** (São Paulo state, Brazil), approximately **10 ton per day** (in the neighborhood of Brás) and **16 ton per day** (in the neighborhood of Bom Retiro) of textile residues are produced and usually this waste ends up in landfills.

Solid waste recycling on the basis of Brazilian legislation

Brazilian National Policy on Solid Waste (Política Nacional de Resíduos Sólidos – PNRS)

In Brazil, the Law n. 12.305/10 (Aug 02, 2010) establishes integrated management and the proper environmental management of solid waste.



Solid waste recycling on the basis of Brazilian legislation

Proposal of Amendment to the Brazilian Constitution - PEC 01/2012

This initiative of Senator Paul Bauer (PSDB/SC) may represent a great incentive to the recycling chain in Brazil. **It aims to provide immunity of taxes for products made with materials reused or recycled.**

This PEC was approved unanimously at September 12th, 2012 by the Commission of Constitution and Justice of the Senate. The text needs to be voted in Plenary in two turns and, if approved, voted again in the House of Representatives.



RECENT PAST



STREET COLLECTORS



NOWAYS

- **THE MAJORITY OF TEXTILE RESIDUES ARE STILL DISCARDED IN LANDFILLS.**
- Negligible part directed to reuse in social programs (estimated by the author in less than 3%).
- There is an incipient trade of textile residues for recycling in São Paulo State (mainly São Paulo city):

Material	Approximate value (per kg)*
Cotton plain fabric (with some impurities)	R\$ 0.12 (near 0.04 €)
Cotton plain fabric (clean)	R\$ 0.15 (near 0.05 €)
White cotton knit (clean)	R\$ 1.20 (near 0.40 €)
Acrilic knit (clean)	R\$ 0.70 (near 0.23 €)

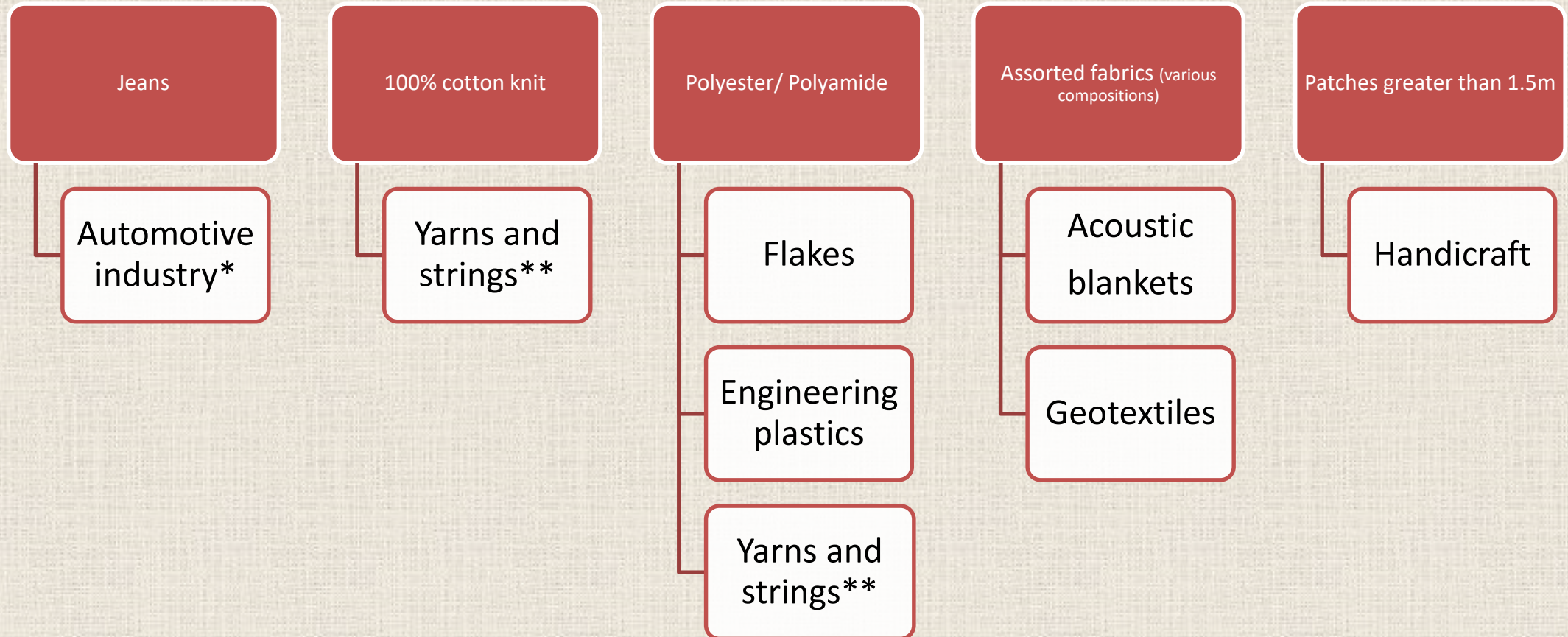
- Brazilian imports of scraps and residues (silk, wool, cotton, artificial and synthetic fibers) –2012**

Liq. Kg	US\$ (FOB cost)
9.829.928	11.421.644

*Source: Interview JF Fibres company, 2014.

**Source: MDIC - System - ALICEWEB, 2013.

POSSIBILITIES FOR DESTINATION OF TEXTILE RESIDUES



*Composites (phenolic resin + cotton recycled fibers); acoustic and/or engine blankets, etc.

**For the manufacture of recycled yarns and strings it is necessary that the residue is clean, separated by color and composition.

BOM RETIRO neighborhood – Case study

The neighborhood of Bom Retiro, together with Brás, represent important textile centers in the city of São Paulo. Almost **50%** of all clothing consumed in Brazil is originated from these producer regions. Within this perimeter are estimated **per day**, originated by the clothing manufacturer sector, **16 tons** of textile waste in Bom Retiro area and **10 tons** near the Square of Korea Republic in Brás* and almost all these textile residues end up in landfills**.



*Source: LOGA, 2011

**Source: ZONATTI, 2013; LOGA, 2011.

REGION OF COLLECTION (**Bom Retiro** neighborhood)



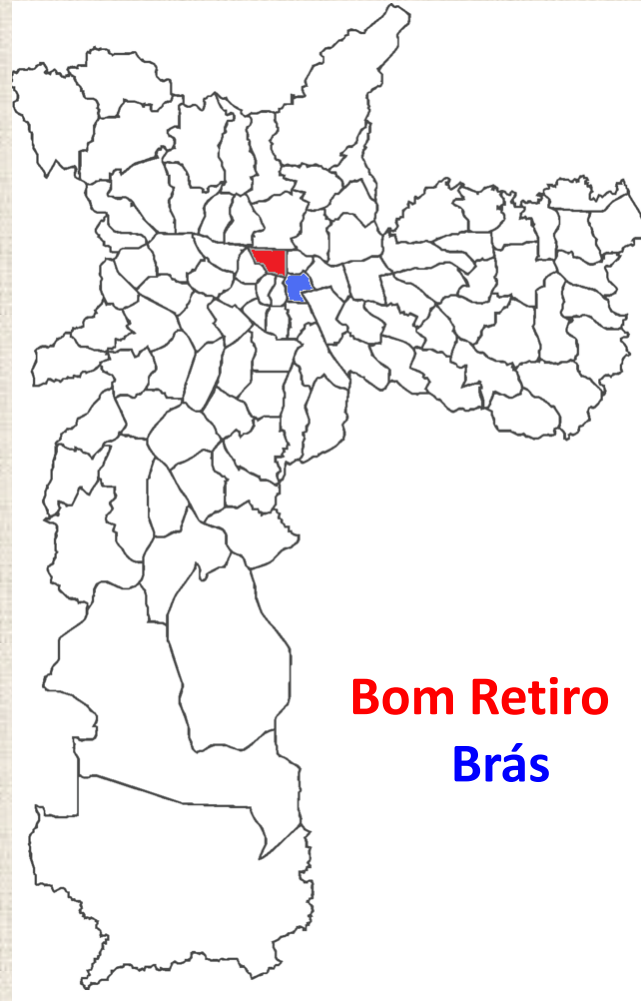
The region of Bom Retiro has **1,700 companies**, according to estimates from the Câmara dos Dirigentes Lojistas (CDL) do Bom Retiro (“chamber of shopkeepers from Bom Retiro”).

Among them, approximately **1,000 factories** in steps of cutting, sewing or embroidery.



REGION OF COLLECTION (**Brás** neighborhood)

According to Alobrás (“association of shopkeepers from Brás”), this region has **4,000 companies**, among these, approximately 2,500 of the confection sector.



RESULTS OF TEST COLLECTING

May/2013



Type of Material	kg
Paper / Cardboard	256.3
Tetra Pack	10.7
Plastics	362.8
Isopor and Foams	8.6
Rubbers	7.0
Scraps	398.2
Timbers	4.0
Organics	441.6
Others	155.7
Fabrics	1,652.9
TOTAL	3,297.9

TOTAL FABRICS **1,662.01 kg**
TOTAL SINTETIC **90%**
TOTAL NON SINTETIC **10%**



FABRICS **50%**
SCRAPS **12%**
ORGANICS **13%**
PAPER/CARDBOARD **7,7%**
PLASTICS **11%**
OTHERS **6,3%**
TOTAL **100%**

EXAMPLES OF BRAZILIANS RECYCLING ENTERPRISES

Although there is still a huge potential for textile residues industry and market in Brazil, by analyzing of cases from three recycling companies, using public information, it is possible to compare the **current state of recycling technologies** in Brazil, the possibilities of **reverse logistics processes** and exemplify viable alternatives for textile residues as determined by the Brazilian National Policy on Solid Waste.

JF Fibras (http://jffibras.com.br/quem_somos.php)

Ecosimple (<http://www.ecosimple.com.br/>)

H3 Polímeros (<http://www.h3polimeros.com.br/empresa.html>)

JF Fibras

- It processes textile residues shredding them. Its main raw material is the denim fabric (employed in manufacture of jeans). In lesser extent it also works with residues of knit cotton and other composition fabrics.
- Per month near 1,100 tons of shredded textile waste are processed. For this, the company has a collection point in the Brás neighborhood, besides buying textile scraps in other cities in São Paulo State and in the textile from southern of Minas Gerais State.
- Their products are destined mainly for the automotive industry, which uses shredded textile material to manufacture acoustic insulation and/or engine blankets and phenolic composites.



Figure 01. Shredded products*

ECOSIMPLE

- Fabric residues are collected and forward to small cooperatives, where the patches and scrapes are separated by color and sent to the company.
- Fabric residues, adequately separated by color, follow the steps for cutting, shredding, spinning and weaving. The desired colors and hues are obtained from the original colors of fabrics without the need of water to make dyeing, creating a recycled quality fabric.

<http://www.youtube.com/watch?v=kuzo9GsQums>

(<http://www.ecosimple.com.br/>)

H3 POLÍMEROS

- It has a proprietary technology for the production of nylon and polyester polymers, exclusive in this segment, which pass through the reverse logistics process.
- The company collects knitted fabrics of nylon and polyester, for example, scraps from the manufacture of stockings, removes the spandex from the fabric by the patented process, decontaminates, grinds, compresses the raw materials until the stage of transformation into pellets which will be sold as plastic engineered to be molded according to the end use.
- The production capacity is 150 tons of nylon and 250 tons of polyester per month. Products manufactured with the pellets are varied, since interceptors socket parts of electronics, toys, household appliances, among others.

(<http://www.h3polimeros.com.br/empresa.html>)

CONCLUSIONS

- The planning and execution of a management project of textile residues will provide environmental and social benefits. Besides, they can also be a factor of market differentiation, competitiveness, increased efficiency, economy and adequacy to the Brazilian National Policy on Solid Waste.
- There are technologies employed in Brazil for textile recycling for production of engineering plastics, blankets, rags, coatings, strings, yarns, raw material for patchwork or handicraft, etc.
- There is a problem for implantation and execution of reverse logistics of textile residues, being one of the main difficulties the awareness and dissemination in companies.
- Soon the PNRS will be a reality for all industries. However, it is necessary that textile residues are valued and that tax incentives are created to encourage the manufacturers of recycled textiles and promoting technological development in the sector.

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