



Hospital Efficiency Changes from Health Information Exchange Participation

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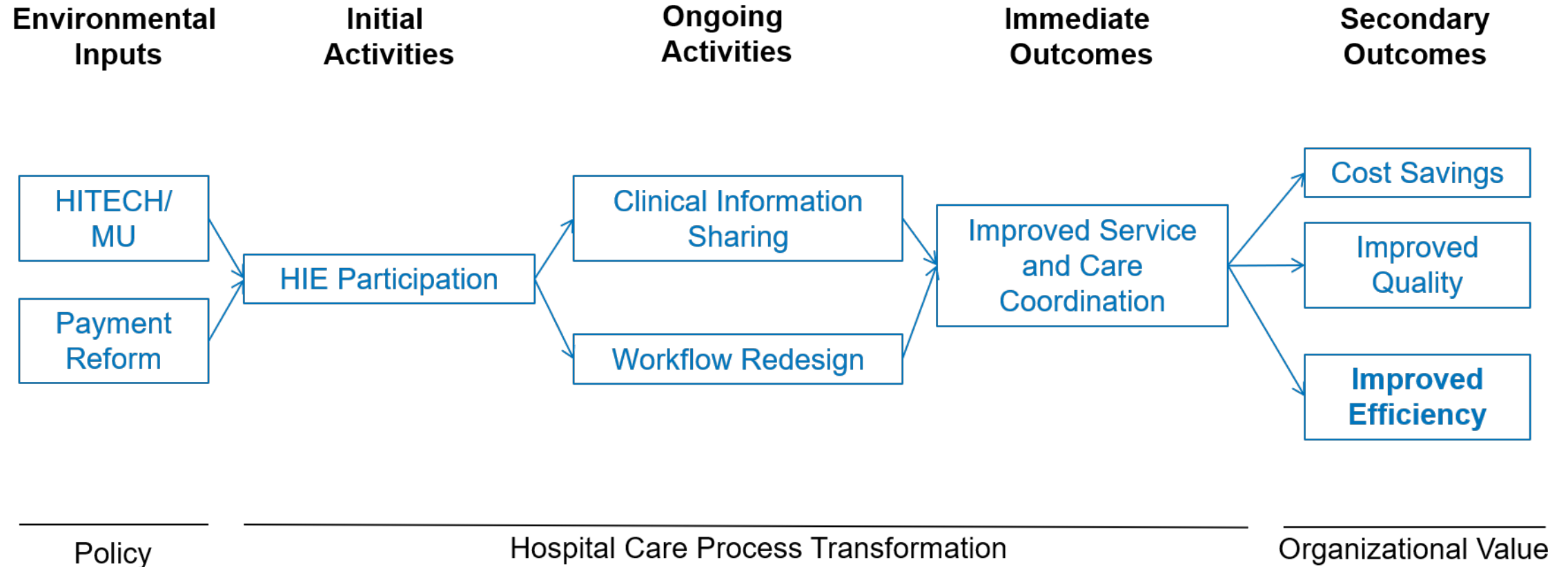
**Does participation in
an HIE improve
hospital efficiency?**

A HITECH Perspective of HIE



What is the Value Proposition of HIE?

A Logic Model Grounded in Organizational Value (Walker, 2017)



Which organizations achieve the value proposition?

Efficiency vs. Productivity

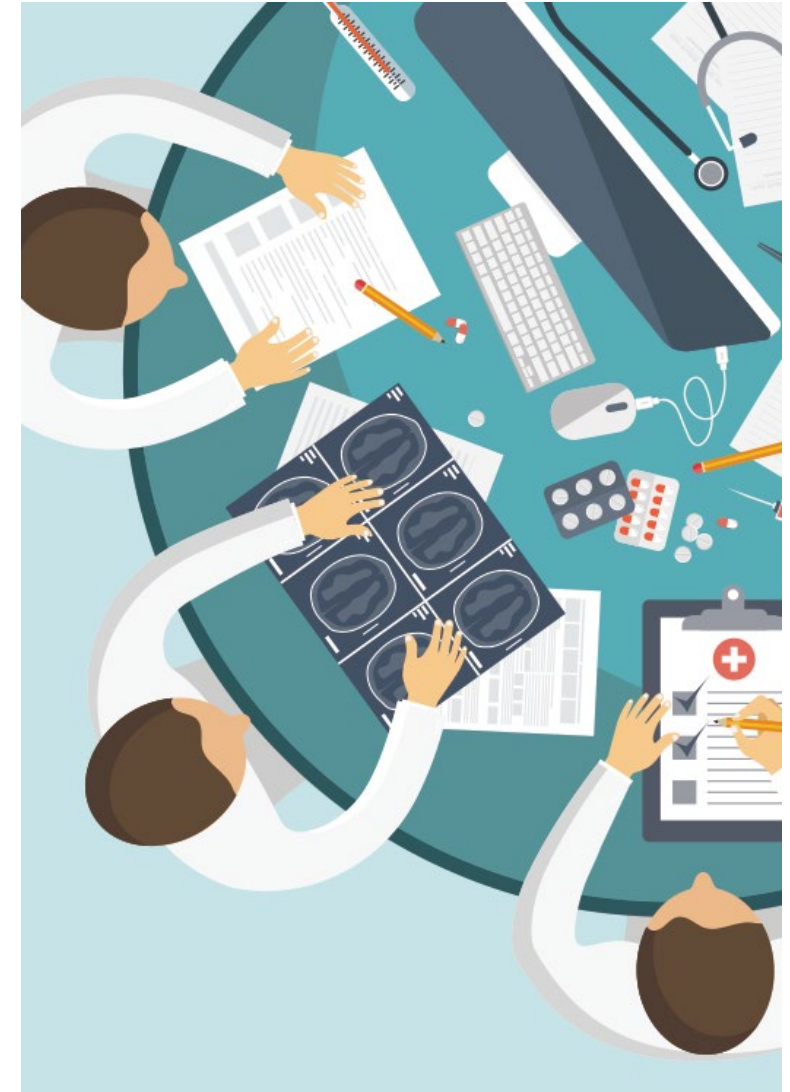
- Efficiency is the transformation of inputs to outputs
- Productivity as sustained Efficiency: Total Factor Productivity (TFP)

Do the same things better (more efficiently)

Technical Efficiency Change (TEC)

Do new things (innovation)

Technological Change (TC)

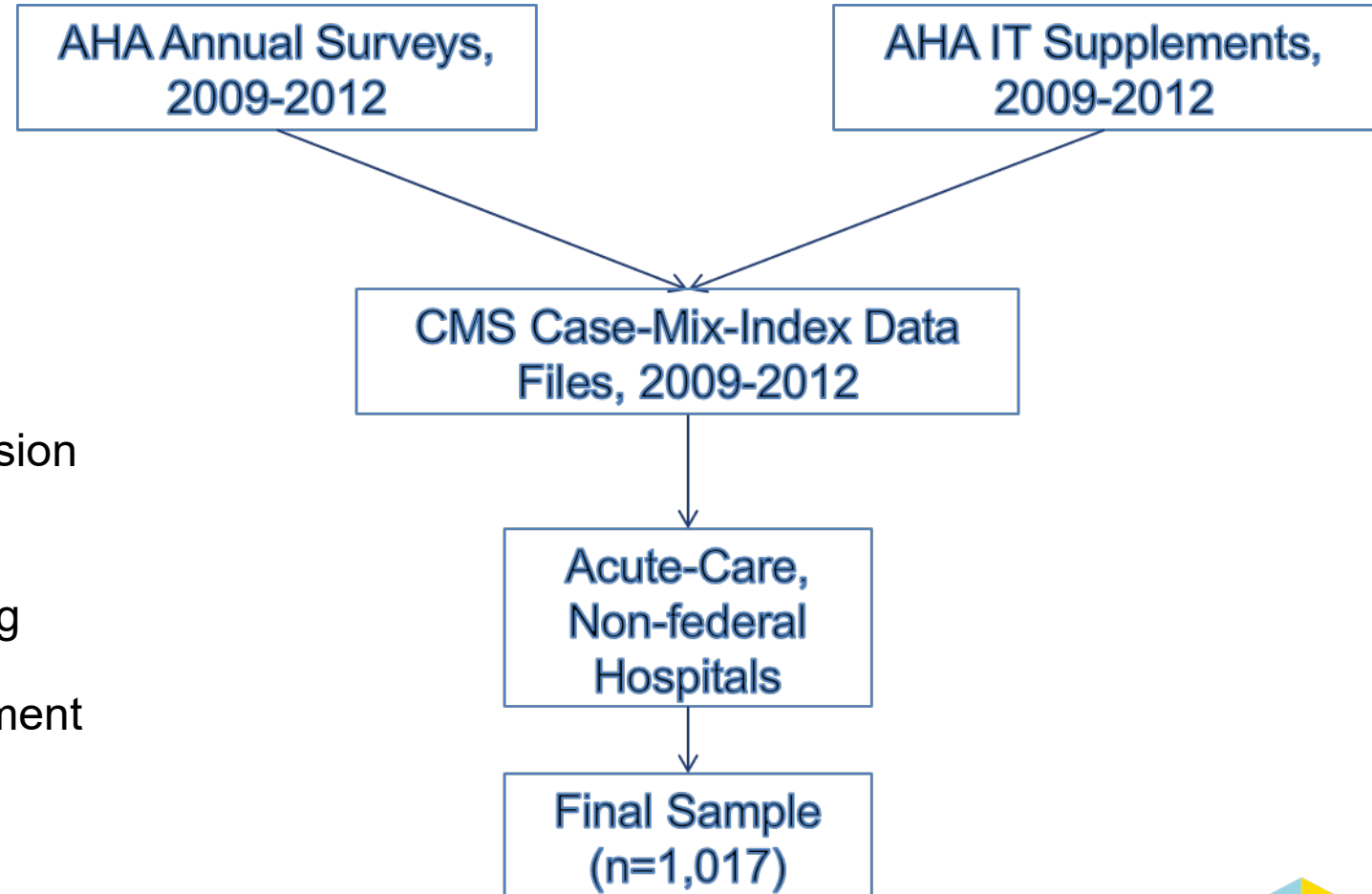


Does HIE matter?

1. Do Hospitals that participate in HIE at any time increase TEC, TC, and TFP more over time than those that never participate in HIE.
2. Does greater duration of hospital HIE participation yield greater increases in TEC, TC, and TFP over time.

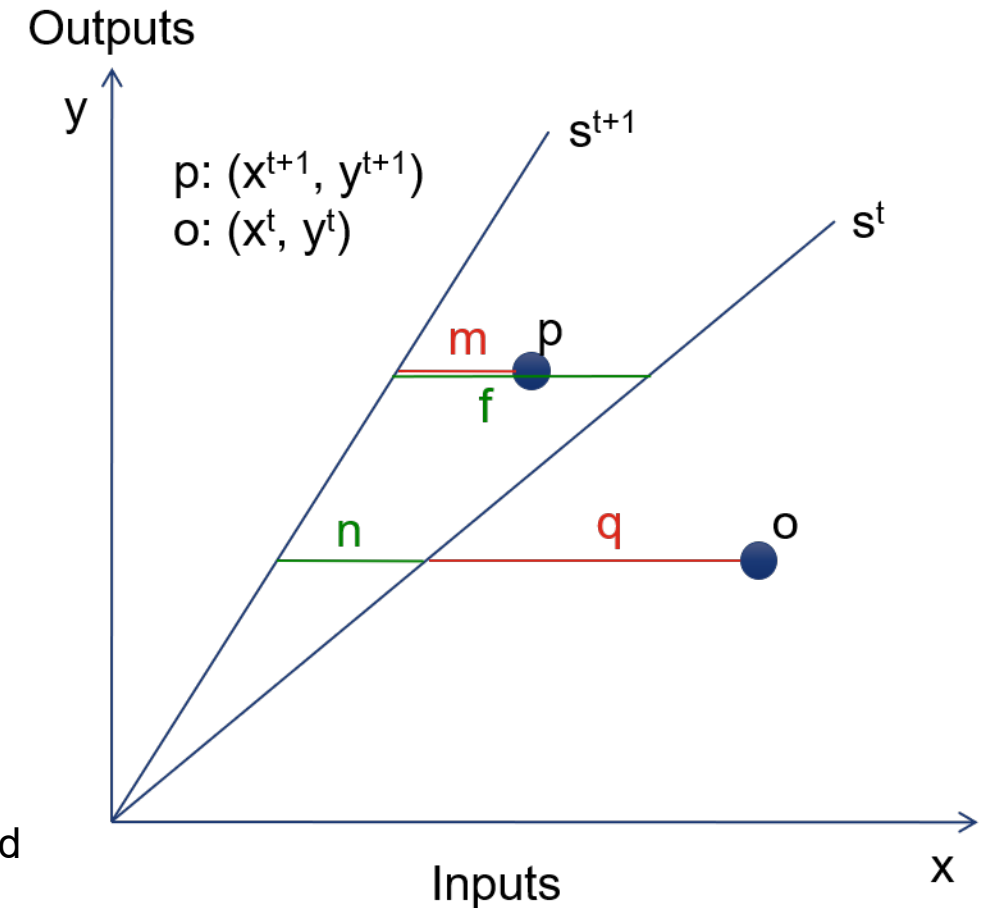
Methods

- Key Independent Variables:
 - H1: Any HIE Participation
 - H2: Total Years of HIE Participation
- Analytical Approach: Ordinal logistic regression
- Data issues
 - Selection: Inverse Probability Weighting
 - Endogeneity: Propensity Score Adjustment



Methods

- Outcomes: TEC, TC, TFP
 - Malmquist Algorithm (DEA)
 - Type of Data Envelopment Analysis
 - Sets 'frontier' of efficiency
 - Compares each hospital to frontier
 - Rather than to 'average' hospital (regression)
 - Can shift along frontier and/ or frontier can shift
- Uses a set of inputs and outputs to determine frontier of hospital efficiency
 - Inputs: Total Licensed Beds, Licenses Nursing Staff, Other FTEs
 - Outputs: Surgical Outpatient Visits; MCMI Adjusted Admissions; Average Daily Census; ED Visits; Outpatient Load
- Market based analysis
 - Within each Census Region:
 - Combined Division/Metro & Suburban/Rural CBSA



$$\begin{aligned} \text{TEC} &= (q/m) \\ \text{TC} &= (n/f) \\ \text{TFP} &= f((q/m) * (n/f)) \end{aligned}$$



Results

Results: H1 – Any HIE Participation

Variable	Outcome		
	TEC OR (95% CI)	TC OR (95% CI)	TFP OR (95% CI)
Any HIE Participation	1.29 (1.03-1.64)*	1.06 (0.84-1.33)	1.32 (1.05-1.67)*
EHR Status:			
None	Ref.	Ref.	Ref.
Basic	1.21 (0.92-1.35)	0.99 (0.74-1.34)	1.36 (1.04-1.77)**
Comprehensive	0.96 (0.68-1.35)	0.90 (0.60-1.35)	0.87 (0.59-1.28)

Notes: *p<.05; **p<.01;

Additional Covariates: Teaching; System Membership; Ownership Type; Bed Size; Herfindahl Index

Results: H1 – Any HIE Participation

Variable	Outcome		
	TEC OR (95% CI)	TC OR (95% CI)	TFP OR (95% CI)
Years of HIE:			
None	Ref.	Ref.	Ref.
1 Year	1.25 (0.93-1.68)	1.10 (0.83-1.46)	1.33 (1.00-1.77)*
2 Years	1.29 (0.91-1.84)	0.87 (0.62-1.23)	1.17 (0.82-1.67)
3 Years	1.46 (0.97-2.20)	1.53 (0.95-2.45)	1.73 (1.17-2.56)**
4 Years	1.32 (0.78-2.23)	0.96 (0.55-1.67)	1.26 (0.58-2.71)
EHR Status:			
None	Ref.	Ref.	Ref.
Basic	1.21 (0.92-1.35)	0.99 (0.74-1.34)	1.36 (1.04-1.77)**
Comprehensive	0.96 (0.68-1.35)	0.90 (0.60-1.35)	0.87 (0.59-1.28)

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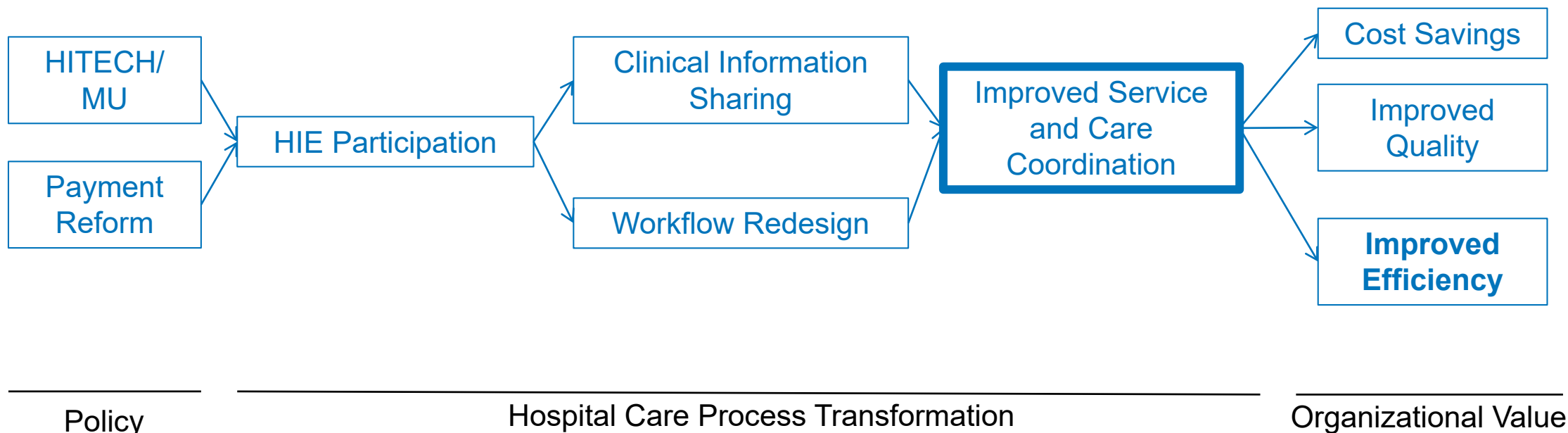
A large, abstract graphic on the left side of the slide, composed of numerous overlapping triangles and polygons in various shades of blue, green, yellow, and orange, creating a complex, multi-dimensional geometric pattern.

Discussion

Discussion

- Any HIE improves TEC and TFP, but not TC
- Some evidence of learning effect at 1 and 3 years
- Greater benefits may come from innovation
- Basic EHR improves overall efficiency in both models
- HIE landscape has evolved since 2012
- Efficiency Measurement as a method has shortcomings
- Hospitals represent only one perspective

Future Directions



- Improve ability of HIE to support care coordination and population health
- Develop standard HIE meta-data reporting to promote research
- Questions remain about what information is most useful at the point of care



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Contact ONC

Questions?

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