

MBD for CMM

CMM Automation and
Optimization using Model Based
Definition



Takeaways: Model-Based CMM Measurement



Current CMM processes are manual and expensive

- Highly manual process, risking transcription and interpretation errors
- Resulting quality of CMM program depends on skill, experience, and practices of CMM programmer



Automation and optimization are possible with MBE

- Process can be automated, massively decreasing time spent to create the program
- Resulting program can be optimized for the job based on measurement resource availability and measurement uncertainty requirements



Technology is ready and already showing ROI

- Off-the-shelf software applications can carry out this workflow
- Workflow demonstration: how does it work?
- Workflow automation results: time saved

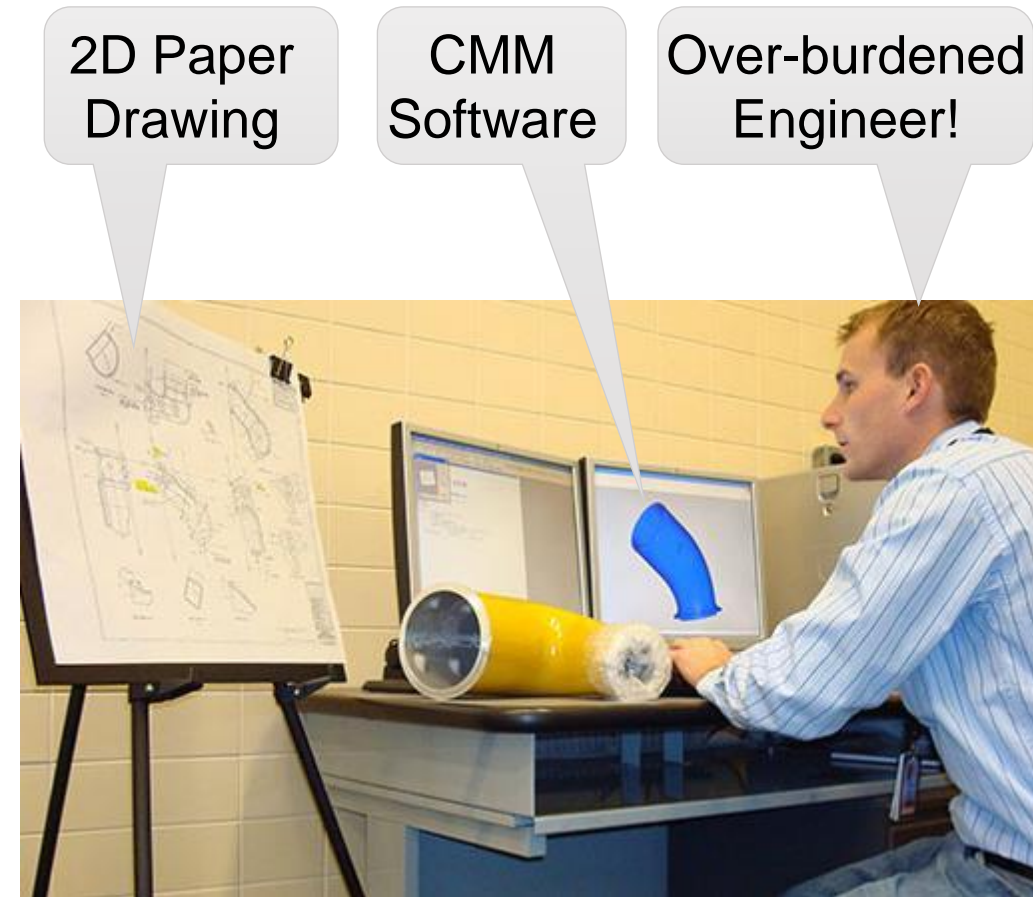
CMM Programming: Current State

Issues with current Computer Aided Inspection Process

- **Manual transcription** of GD&T / PMI into inspection software can lead to conflicts and inaccuracies
- High risk of **CAD translation or interpretation errors** with GD&T
- Requires a **skilled CMM technician** with expert knowledge of GD&T, CAD and measurement
- Personnel and machine dependent
- **Labor intensive** - can take weeks to program a single part

Enterprise measurement data is siloed:

- Multiple, **proprietary data formats** are used
- **Not linked to “single source of truth”** – the design model and PLM



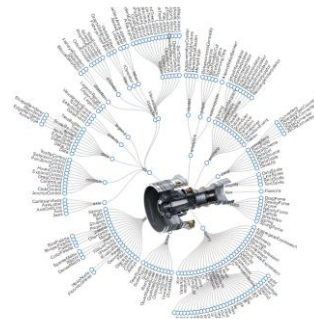
What is QIF?



Feature-Based
Ontology of
Manufacturing Quality
Metadata



XML Technology:
Simple Implementation
and Built-In Code
Validation

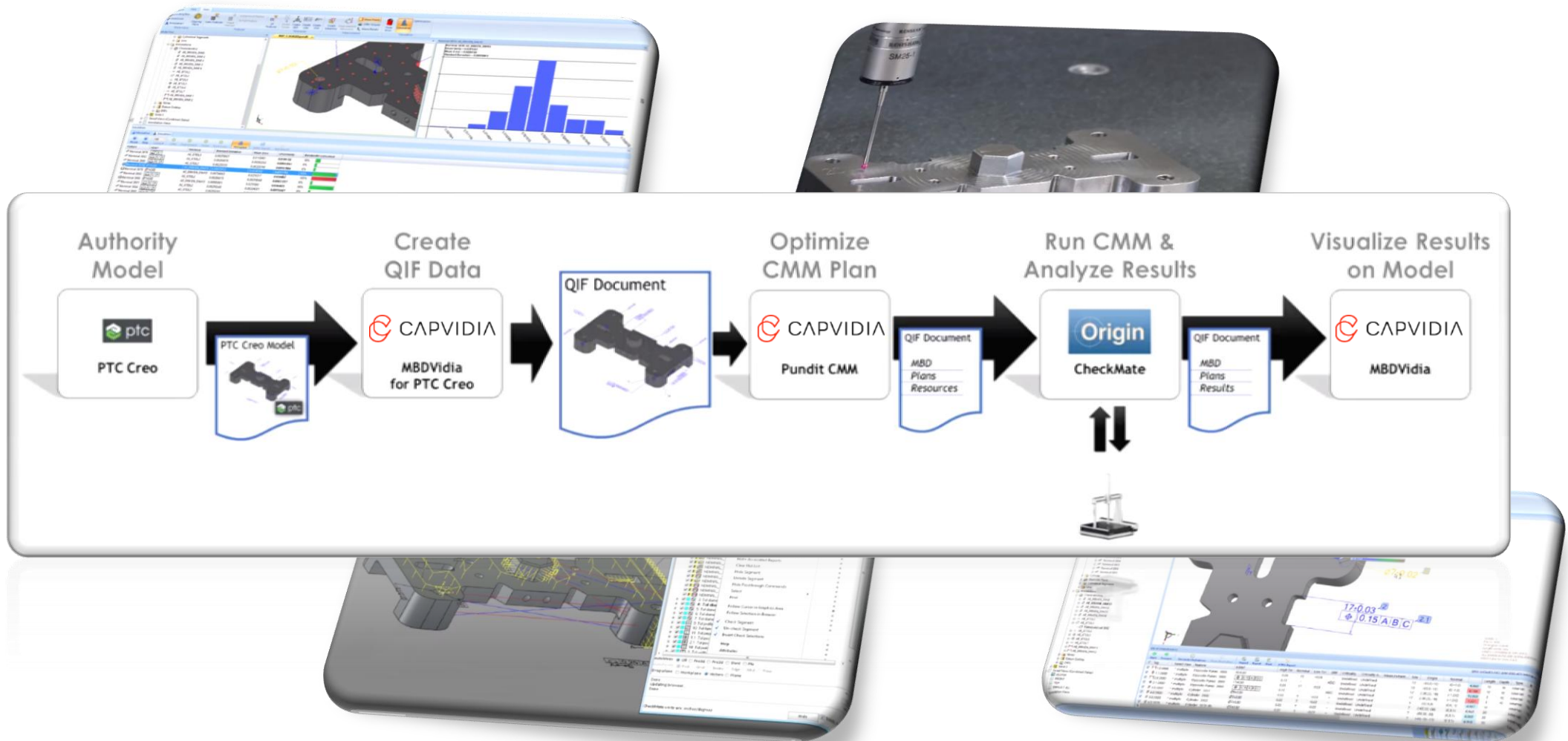


Data semantically
linked to Model for full
data traceability to
CAD

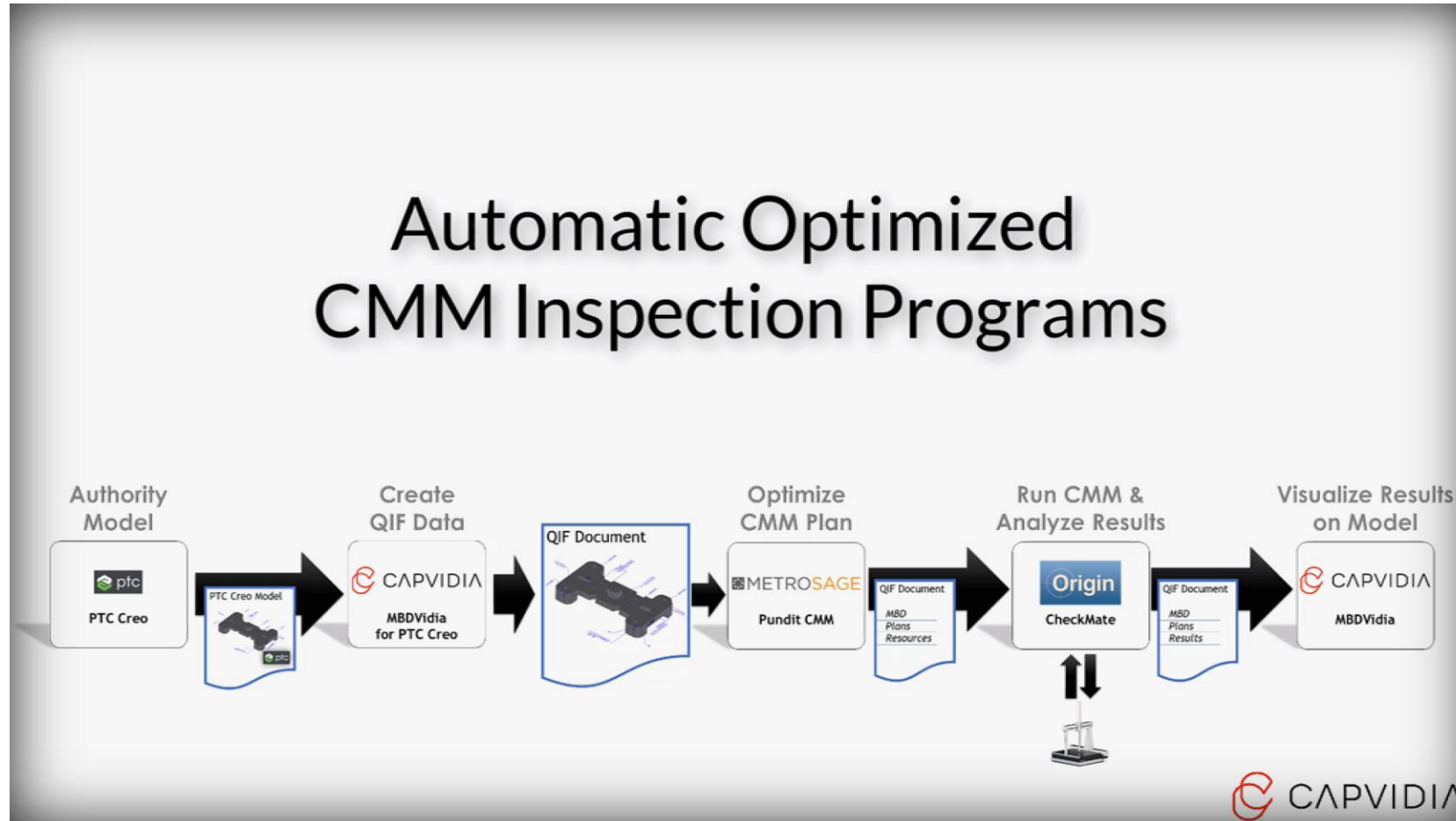
QIF Application Areas



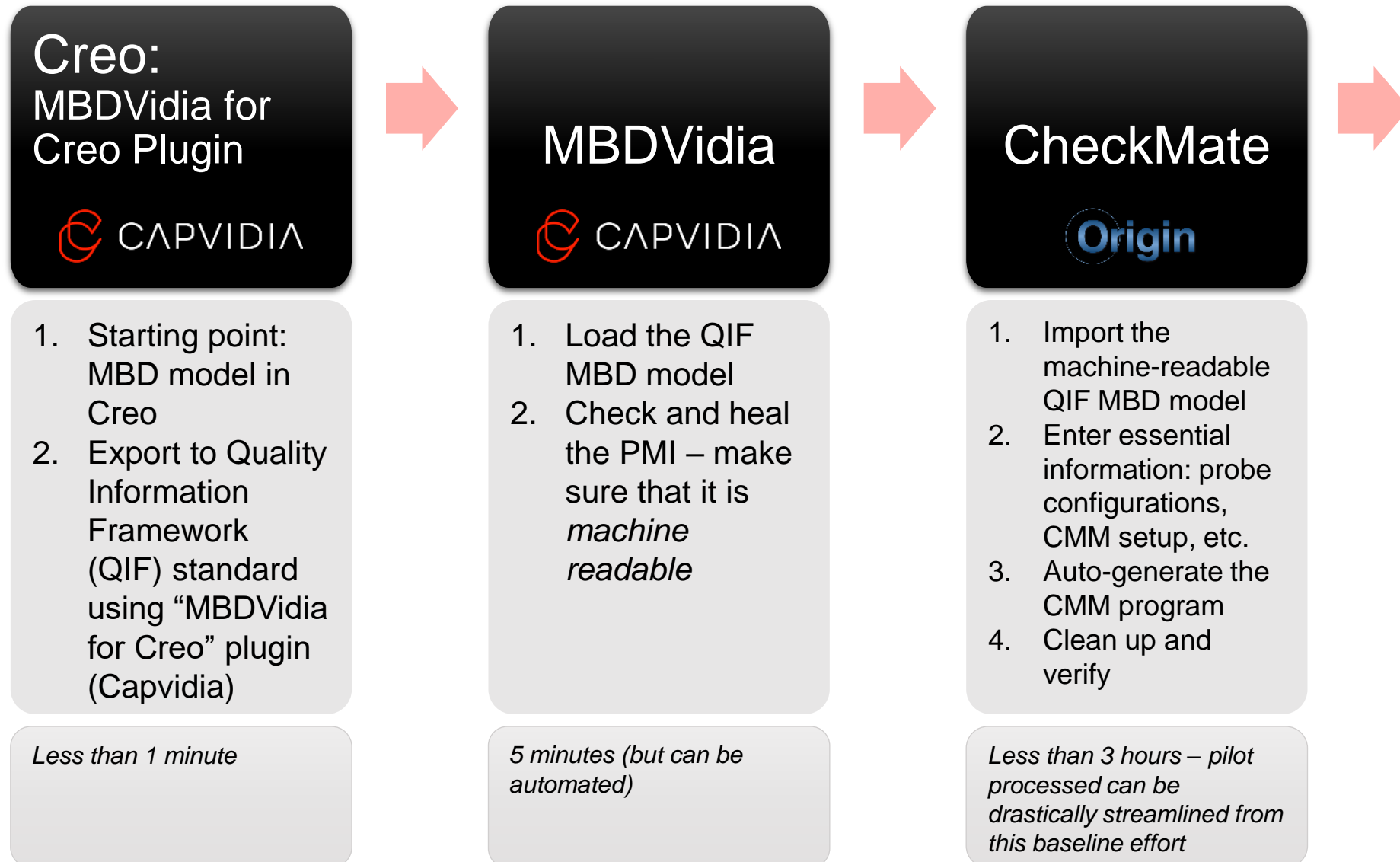
MBD-Based CMM Workflow



[Watch the workflow here](#)



Raytheon Pilot Workflow



Simple ROI Analysis

Current Workflow

Total hours, existing manual workflow	16 Hours
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New MBD Workflow

MBDVidia	5 Minutes
FormatWorks import of Creo file	5 Minutes
Checkmate Setup Parameters	5 Minutes
Checkmate Auto Programming	
Accessibility	15 Minutes
Sorting for dependencies	1 Minutes
Auto Coordinate Systems	1 Minutes
Probe moves/rotations	1 Minutes
Collision detection	20 Minutes
Manual editing (estimate)	120 Minutes
Post process program	5 Minutes
Total, New MBD Workflow	178 Minutes
Total, New MBD Workflow	2.97 Hours

Today's traditional, manual workflow for this part is estimated at about 16 hours.

The MBD pilot workflow took less than 3 hours.

ROI Analysis

Time reduction

MBD Workflow time vs. Manual Workflow Time	19%
MBD Workflow decreases total time by:	81%

ROI Analysis

Hours saved on MBD Workflow	13.03
Number of parts programmed per year	80
Total yearly labor reduction	1,042 hours

81% Reduction in Time

Value of MBD Measurement



Reduce inspection costs

Inspection planning is a laborious task involving skilled technicians – automation decreases its cost significantly



Faster time-to-inspection

Faster product delivery. Inspection is typically a bottleneck in production – this approach can streamline manufacturing processes



Increase inspection quality

- Utilize measurement uncertainty simulation
- Implement organizational guidelines — rely on corporate process, not personnel



Bring measurement data into the digital thread

Measurement data has immense value – don't use it for PASS/FAIL inspection and then discard. MBD traceable data is ready for analytics



Lower risk for transcription & interpretation errors

Software automation lowers the risk of transcription or interpretation errors of data, and creates opportunities for validation of data

Thanks!

Any questions – contact us!

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