PANDAO
FROM OPTICS TO FABRICATION

conclusion

PANDAO
FROM OPTICS TO FABRICATION

Reduce your optics fabrication cost and risk

Simulate fabrication during optics design

Find the optimal supplier during purchasing

Get a free live demo of our new software tool

https://pandao.ch/livedemo/

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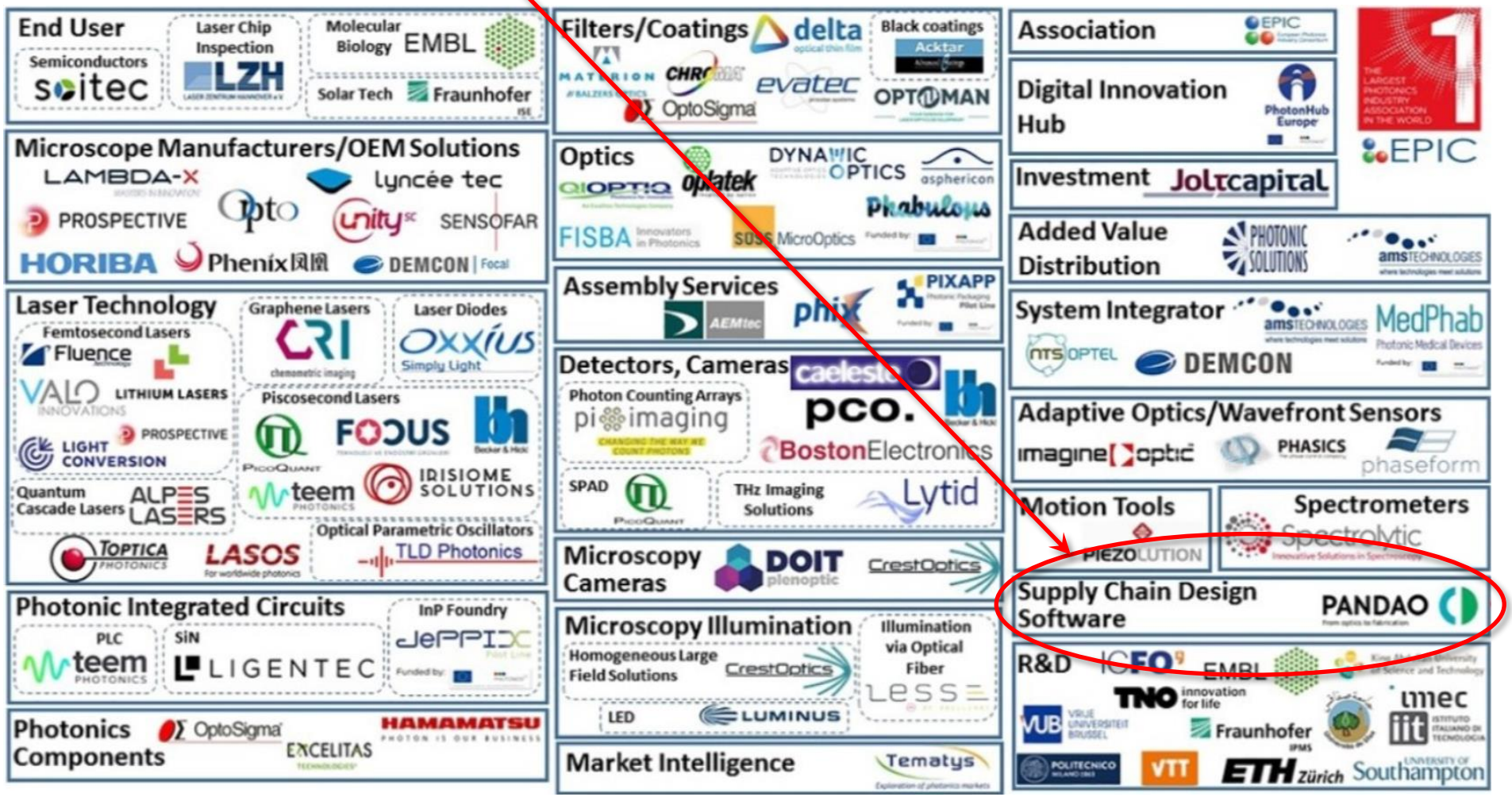
A whole new kind of software for the optical industry

- **EPIC's new category**



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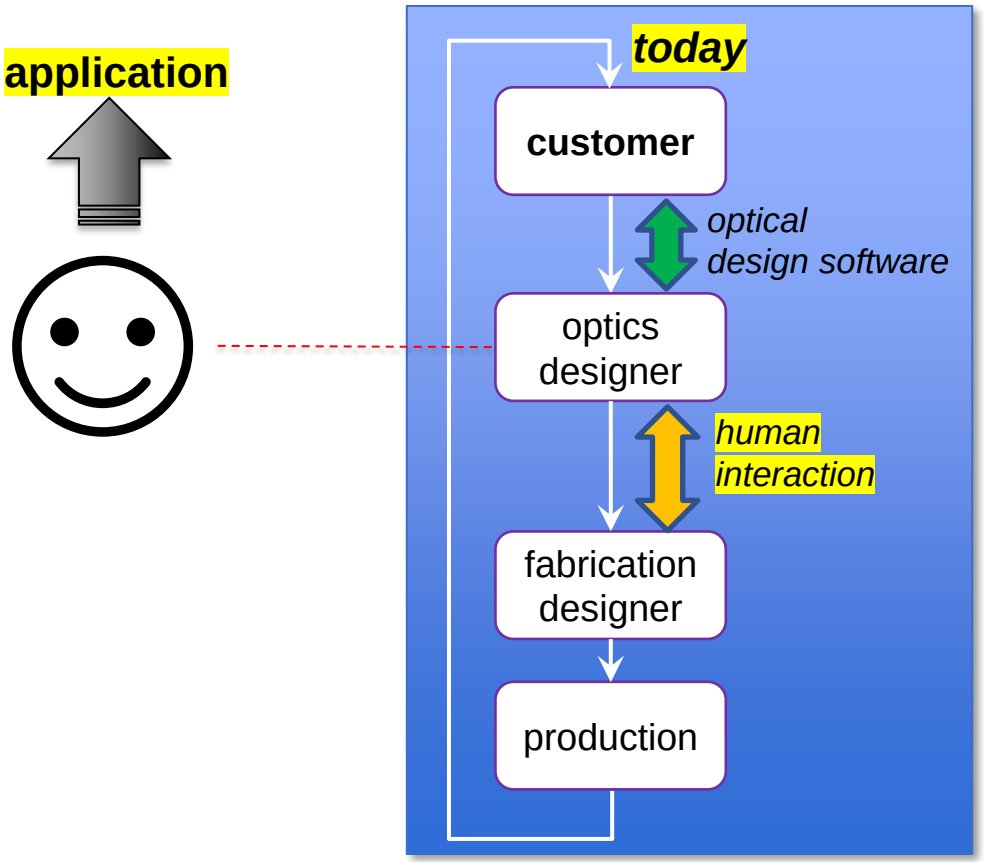
optical fabrication chain design



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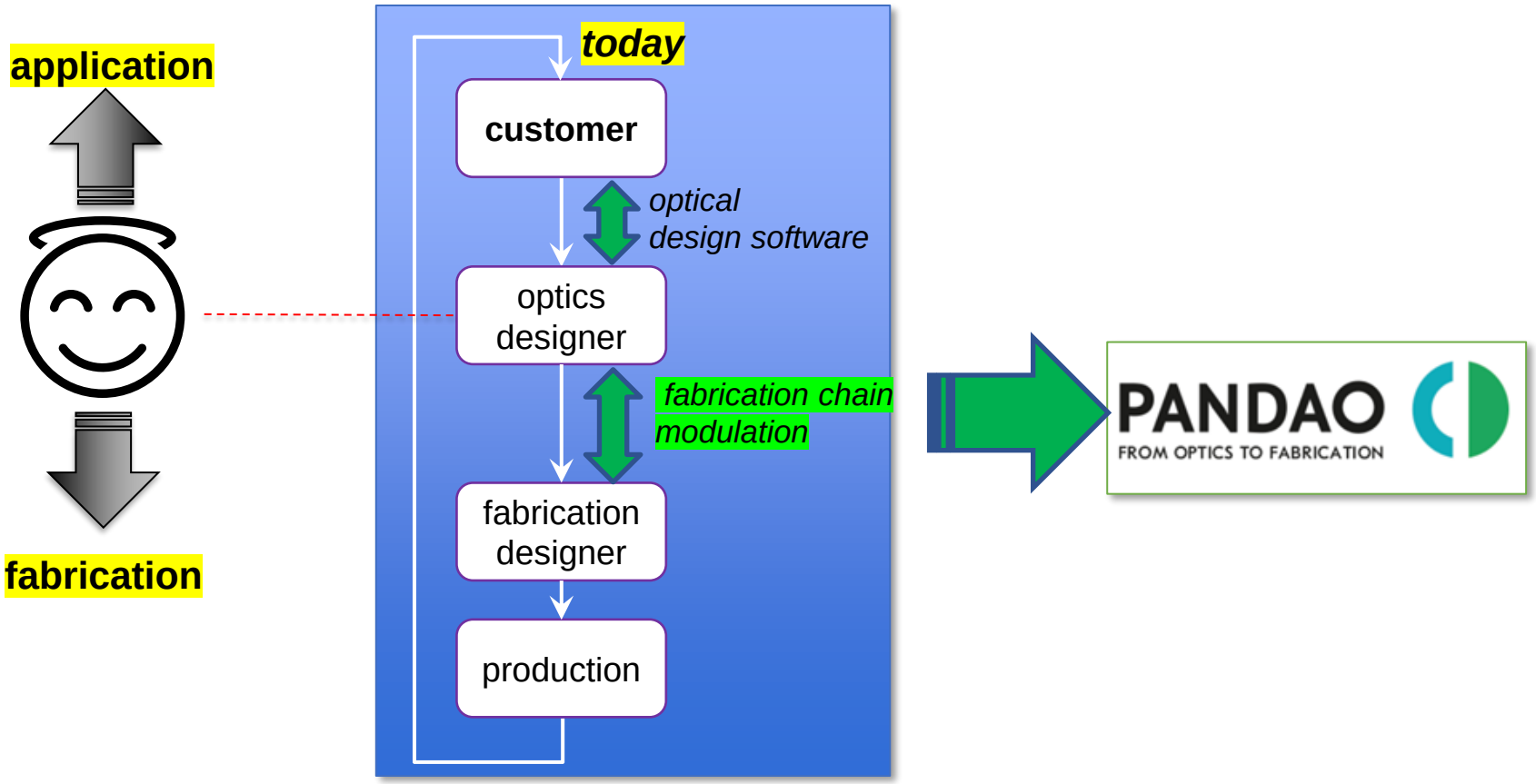
optical fabrication chain design



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PANDAO
FROM OPTICS TO FABRICATION

modulation

INPUT

- ISO10110
- throughput

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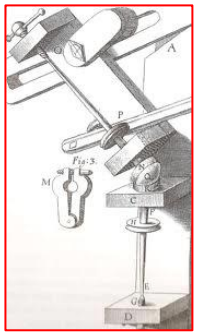
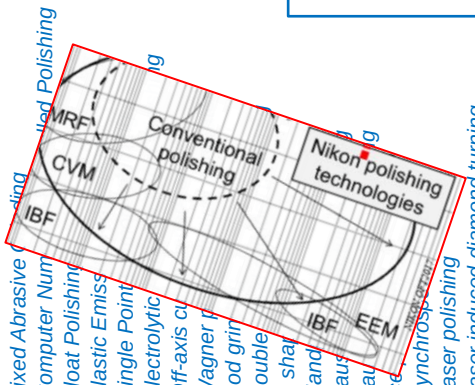
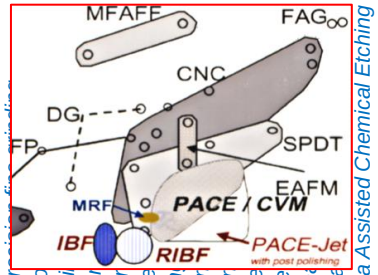
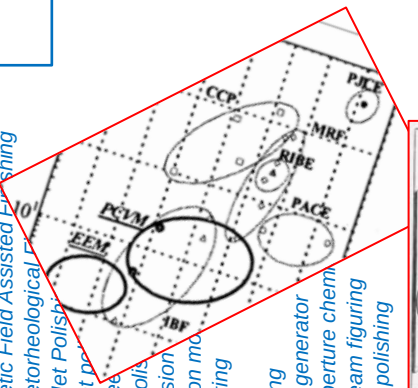
OUTPUT

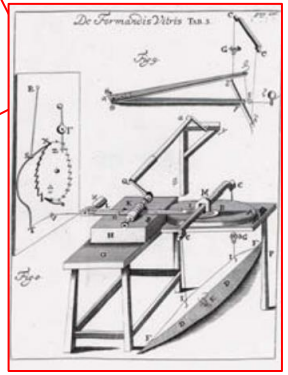
- 360 OFT techniques
- industrial & academic data clouds
- physics inside
- 30 years of experience
- smart algorithm











Fixed Abrasive ... Computer Num... Float Polishing ... Elastic Emiss... Single Point ... Electrolytic ... Off-axis c... Wagner ... Rod grin... Double ... D sha... Hand... Faus... Fa... Ic... Synchrosp... Laser polishing ... Laser induced diamond turning ... ultra p... Ultraso... Laser i... Rockn... Belli Tr... Double ... Lappin... Overar... Overar... Double ... Ductile ... Ion Be... Ion bea... Plasma Assisted Chemical Etching ... Chemical Vapor Machining ... Magnetic Field Assisted F... Magnetorheological F... Fluid Jet Polish... Bonnet p... Bowlfe... float polis... prcecision ... Injection mo... fly cutting ... Milling ... Grinding ... Curve generator ... Full aperture chem... iotn beam figuring ... Super polishing

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PANDAO
FROM OPTICS TO FABRICATION

modulation

INPUT

- ISO10110
- throughput

PANDAO
FROM OPTICS TO FABRICATION

OUTPUT

- optimal fabrication chain

Resulting most cost-efficient fabrication chain:

Resulting fastest fabrication chain:

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asphere: tightening irregulatity

- diam 220 mm, N-BK7, 2 lambda PV

Name: Asphere	Description: Jose Pozo	Number of Sides: One	Material: glasses
Batch Size: 1000	Lens Diameter [mm]: 220	Center Thickness [mm]: 30	Knoop hardness (HK): 600
Total Number Of Lenses: 5000	Diameter Tolerance [mm]: 0.1	Center Thickness Tolerance [mm]: 0.05	Acid resistance (AR): AR1
Suited for LIDT	Outer cylinder length bigger lens diameter		Material suited for precision glass molding

Side 1

Shape: aspheres	Defect Size(5/)[mm]: 0.063	Clear Aperture[mm]: 200	3/Power[fringes]: 3
Roughness: Custom (Sq [nm 1	smallest midspatial wavelength accepted [mm]: 5	Decenter(4/)[min]: Specified: 1	3/Irregularity[fringes]: 2
Asphericity[um]: 100	Smallest Radius Of Curvature[mm]: 673	Concave parts included? Not Included	
Radius of removal sphere[mm]: 660	Coating: Antireflex	Sagitta [mm]: 40	

Resulting most cost-efficient fabrication chain:

Side 1:

- cnc sub aperture rough grinding
  - fabrication cost: 8.00€
- cnc sub aperture grinding
  - fabrication cost: 27.45€
- ccp wheel polishing
  - fabrication cost: 80.26€

Cost 115.71€

Capability factor: 0.999

Chain uniqueness: 1

Total fabrication cost: 115.71€

Serial batch lead time: 1.9573 days

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asphere: tightening irregulatity 2/3

- diam 220 mm, N-BK7, 5th lambda PV

Name: Asphere	Description: Jose Pozo	Number of Sides: One	Material: glasses
Batch Size: 1000	Lens Diameter [mm]: 220	Center Thickness [mm]: 30	Knoop hardness (HK): 600
Total Number Of Lenses: 5000	Diameter Tolerance [mm]: 0.1	Center Thickness Tolerance [mm]: 0.05	Acid resistance (AR): AR1
Suited for LIDT	Outer cylinder length bigger lens diameter		Material suited for precision glass molding

Side 1

Shape: aspheres	Defect Size(5/)[mm]: 0.063	Clear Aperture[mm]: 200	3/Power[fringes]: 1
Roughness: Custom (Sq [nm 1	smallest midspatial wavelength accepted [mm]: 5	Decenter(4/)[min]: Specified: 1	3/Irregularity[fringes]: 0.2
Asphericity[um]: 100	Smallest Radius Of Curvature[mm]: 673	Concave parts included? Not Included	
Radius of removal sphere[mm]: 660	Coating: Antireflex	Sagitta [mm]: 40	

Resulting most cost-efficient fabrication chain:

Side 1:

- cnc sub aperture rough grinding
  - fabrication cost: 8.00€
- cnc sub aperture grinding
  - fabrication cost: 27.45€
- ccp wheel polishing
  - fabrication cost: 80.26€
- ccp magnetorheological finishing
  - fabrication cost: 30.50€

Cost 146.21€
Capability factor: 1.000
Chain uniqueness: 5

Total fabrication cost: 146.21€

Serial batch lead time: 1.9706 days

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asphere: tightening irregulatity

- diam 220 mm, N-BK7, 10th lambda PV

Name:	Description:	Number of Sides:	Material:
Asphere	Jose Pozo	One	glasses
Batch Size: 1000	Lens Diameter [mm]: 220	Center Thickness [mm]: 30	Knoop hardness (HK): 600
Total Number Of Lenses: 5000	Diameter Tolerance [mm]: 0.1	Center Thickness Tolerance [mm]: 0.05	Acid resistance (AR): AR1
Suited for LIDT	Outer cylinder length bigger lens diameter		Material suited for precision glass molding

Side 1

Shape: aspheres	Defect Size(5/)[mm]: 0.063	Clear Aperture[mm]: 200	3/Power[fringes]: 1
Roughness: Custom (Sq [nm 1	smallest midspatial wavelength accepted [mm]: 5	Decenter(4/)[min]: Specified: 1	3/Irregularity[fringes]: 0.1
Asphericity[um]: 100	Smallest Radius Of Curvature[mm]: 673	Concave parts included? Not Included	
Radius of removal sphere[mm]: 660	Coating: Antireflex	Sagitta [mm]: 40	

Resulting most cost-efficient fabrication chain:

Side 1:

- cnc sub aperture rough grinding
  - fabrication cost: 8.00€
- cnc sub aperture grinding
  - fabrication cost: 27.45€
- ccp bonnet
  - fabrication cost: 88.14€
- ccp ion beam figuring
  - fabrication cost: 39.54€

Cost 163.12€
Capability factor: 0.972
Chain uniqueness: 0

Total fabrication cost: 163.12€

Serial batch lead time: 2.0417 days

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PANDAO
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NEW PRODUCT

INPUT

- ISO10110
- throughput

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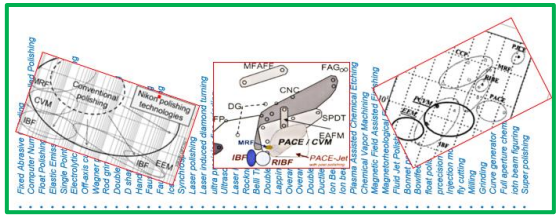
OUTPUT: market performance

- optimal fabrication chain
- using 340 **Technologies**



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PANDAO
FROM OPTICS TO FABRICATION

NEW PRODUCT

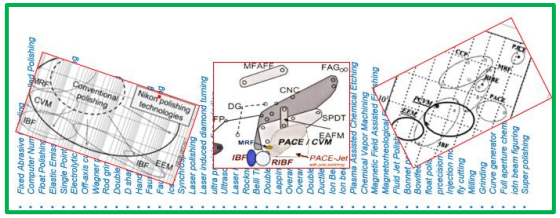
INPUT

- ISO10110
- throughput

PANDAO
FROM OPTICS TO FABRICATION

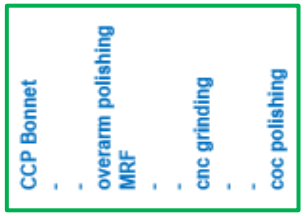
OUTPUT: market performance

- optimal fabrication chain
- using 340 **Technologies**



OUTPUT: company performance

- optimal fabrication chain
- using available **Technologies**



GAIN:

(1) determine delta to State-of-the-Art

(2) evaluate your or your suppliers fabrication chains

(3) demonstrate your excellence to your customer

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