C·O·E CENTERS OF EXCELLENCE FOR LABOR MARKET RESEARCH

Labor Market Analysis: 0702.00/Computer Information Systems
Data Science & Analytics (Certificate requiring 16 to <30 units)

Los Angeles Center of Excellence, January 2023

Summary

Program Endorsement:	Endorsed: All Criteria Met ☐	Endorsed: Some Criteria Met ☒	Not Endorsed ☐

Program Endorsement Criteria		
Supply Gap:	Yes ☑	No ☐
Living Wage: (Entry-Level, 25th)	Yes ☑	No ☐
Education:	Yes ☐	No ☑
Emerging Occupation(s)		
Yes ☐		No ☑

The Los Angeles Center of Excellence for Labor Market Research (LA COE) prepared this report to provide regional labor market supply and demand data related to five data science and analytics occupations:

- ***Computer Systems Analysts* (15-1211)** Analyze science, engineering, business, and other data processing problems to develop and implement solutions to complex applications problems, system administration issues, or network concerns. Perform systems management and integration functions, improve existing computer systems, and review computer system capabilities, workflow, and schedule limitations. May analyze or recommend commercially available software.[1]
- ***Computer Network Support Specialists* (15-1231)** Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption.[2]
- ***Computer Network Architects* (15-1241)** Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning, including analysis of capacity needs for network infrastructures. May also design network and computer security measures. May research and recommend network and data communications hardware and software.[3]
- ***Data Scientists (15-2051)*** Develop and implement a set of techniques or analytics applications to transform raw data into meaningful information using data-oriented programming languages and visualization software. Apply data mining, data modeling, natural language processing, and machine learning to extract and analyze information

[1] Computer Systems Analysts : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)
[2] Computer Support Specialists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)
[3] Computer Network Architects : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)

from large structured and unstructured datasets. Visualize, interpret, and report data findings. May create dynamic data reports.[4]

- ***Statistical Assistants* (43-9111)** Compile and compute data according to statistical formulas for use in statistical studies. May perform actuarial computations and compile charts and graphs for use by actuaries. Includes actuarial clerks.[5]

Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree.[6] Although some of the occupations in this report typically require a bachelor's degree, they are included in this report because approximately one-third of workers in the field have completed some college or an associate degree and/or community college programs have historically trained for these occupations. This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations.

Based on the available data, there appears to be a supply gap for these data science and analytics occupations in the region. Furthermore, entry-level wages exceed the self-sufficiency standard wage in both Los Angeles and Orange counties, and more than one-third of current workers in the field in three of the occupations (*computer network support specialists; computer network architects;* and *statistical assistants)* have completed some college or an associate degree. However, four of the five occupations in this report typically require a bachelor's degree for entry. **Therefore, due to some the criteria being met, the LA COE endorses this proposed program.** Detailed reasons include:

Demand:

- ***Supply Gap Criteria* –** Over the next five years, **2,826 jobs are projected to be available annually** in the region due to new job growth and replacements, **which is more than the three-year average of 1,580 awards conferred** by educational institutions in the region.
    - Over the past 12 months, **there were 2,990 online job postings for the occupations in this report that included "data analytics" and/or "data science" as a preferred skill or qualification.**
- ***Living Wage Criteria* –** Within Los Angeles County, all **five occupations have entry-level wages <u>above</u> the self-sufficiency standard hourly wage** ($18.10/hour).[7]

[4] Data Scientists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov)

[5] Statistical Assistants (bls.gov)

[6] The COE classifies middle-skill jobs as the following:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

[7] Self-Sufficiency Standard wage data was pulled from The Self-Sufficiency Standard Tool for California. For more information, visit: http://selfsufficiencystandard.org/california.

- ***Educational Criteria –*** Within the greater LA/OC region, **83% of the annual job openings** for occupations related to data science and analytics **typically require a bachelor's degree.**
    - While the majority of *computer systems analysts* (74%) and *data scientists* (86%) working in the field have completed a bachelor's degree or more education, **between 35% and 40% of *computer network support specialists, computer network architects,* and *statistical assistants* have completed some college or an associate degree.**

Supply:

- There are **27 community colleges** in the greater LA/OC region that issue awards related to data science and analytics, conferring an average of ***777* awards annually** between 2018 and 2021.
- Between 2017 and 2020, there was an average of **803 awards conferred annually** in related training programs by non-community college institutions throughout the greater LA/OC region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for these data science and analytics occupations. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to increase by 3% through 2026. There will be more than 2,800 job openings per year through 2026 due to job growth and replacements.

Exhibit 1: Occupational demand in Los Angeles and Orange Counties[8]

Geography	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	Annual Openings
Los Angeles	25,883	26,750	867	3%	1,996
Orange	10,814	11,222	408	4%	830
Total	**36,698**	**37,972**	**1,275**	**3%**	**2,826**

Wages

The labor market endorsement in this report considers the entry-level hourly wages for these data science and analytics occupations in Los Angeles County as they relate to the county's self-sufficiency standard wage. Orange County wages are included below in order to provide a complete analysis of the greater LA/OC region. Detailed wage information, by county, is included in Appendix A.

[8] Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Los Angeles County—All five occupations in this report have entry-level hourly wages above the self-sufficiency standard wage for one adult ($18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between $22.44 and $38.24, while experienced workers can expect to earn wages between $38.95 and $73.57.

Exhibit 2: Hourly Earnings for Occupations in LA County

Occupation	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Systems Analysts (15-1211)	$37.19	$49.66	$65.98
Computer Network Support Specialists (15-1231)	$25.12	$31.15	$40.05
Computer Network Architects (151241)	$38.24	$54.14	$73.57
Data Scientists (15-2051)	$37.26	$56.26	$70.90
Statistical Assistants (43-9111)	$22.44	$35.15	$38.95

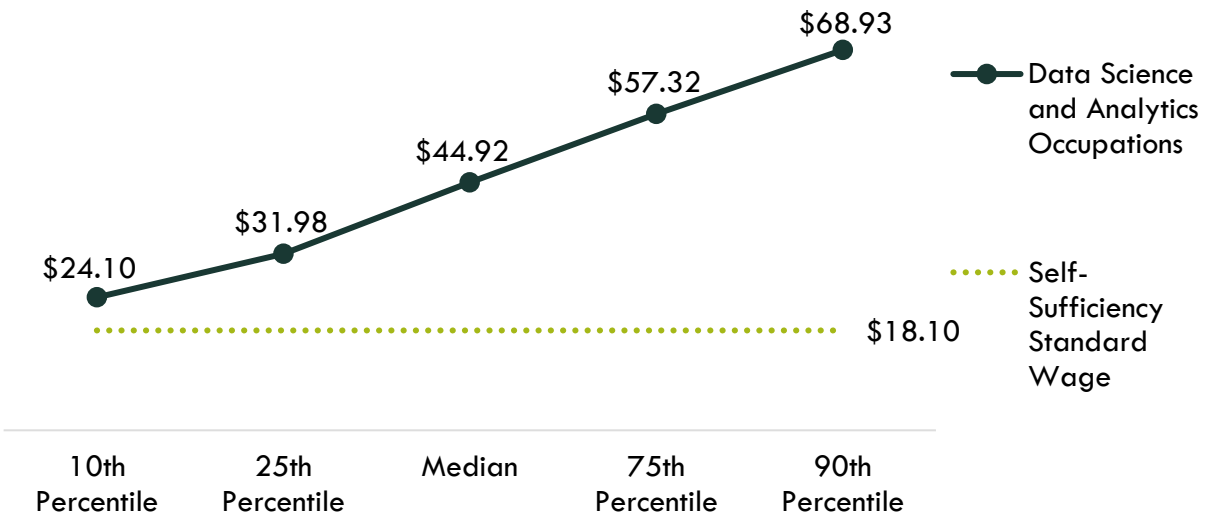
Orange County—All five occupations in this report have entry-level hourly wages above the self-sufficiency standard wage for one adult ($20.63 in Orange County). Typical entry-level hourly wages are in a range between $21.66 and $37.50, while experienced workers can expect to earn wages between $37.13 and $71.14.

Exhibit 3: Hourly Earnings for Occupations in Orange County

Occupation	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Systems Analysts (15-1211)	$37.17	$48.45	$63.44
Computer Network Support Specialists (15-1231)	$25.16	$30.79	$39.02
Computer Network Architects (15-1241)	$37.50	$52.69	$71.14
Data Scientists (15-2051)	$36.93	$55.03	$68.47
Statistical Assistants (43-9111)	$21.66	$34.35	$37.13

On average, the entry-level earnings for the occupations in this report are $31.98; this is above the living wage for one single adult in Los Angeles County ($18.10). Exhibit 4 shows the average wage for the occupations in this report, from entry-level to experienced workers.

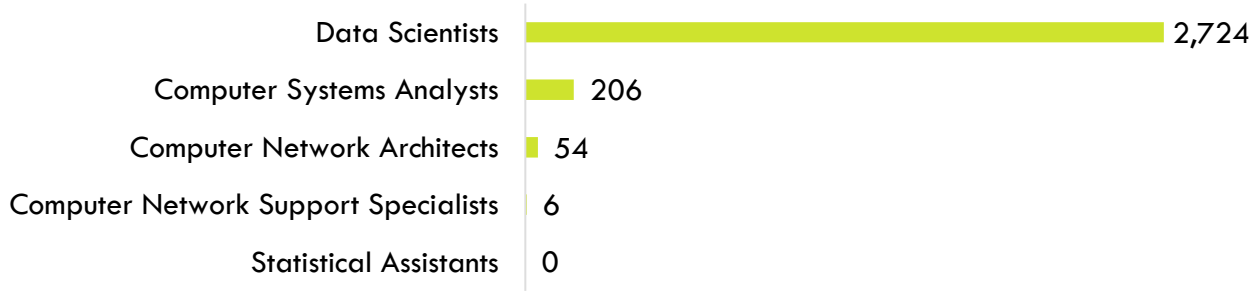
Exhibit 4: Average Hourly Earnings for Statistical Data Analysis Occupations in LA/OC



Job Postings

Over the past 12 months, **there were 2,990 online job postings for the occupations in this report that included "data analytics" and/or "data science" as a preferred skill or qualification.** Exhibit 5 displays the number of job postings by occupation. The majority of job postings (91%) were for *data scientists,* followed by *computer systems analysts* (7%) and *computer network architects* (2%). The highest number of job postings were for data scientists, data analysts, data science managers, machine learning engineers, and data analytics scientists. The top skills were data science, Python programming language, SQL programming language, machine learning, and data analysis. The top three employers, by number of job postings, in the region were Elevance Health, Deloitte, and Verizon Communications.

Exhibit 5: Job postings by occupation (last 12 months)



Educational Attainment

The Bureau of Labor Statistics (BLS) lists the following typical entry-level education levels for the occupations in this report:

- **Bachelor's degree:** *Computer systems analysts; computer network architects; data scientists; statistical assistants*
- **Associate degree:** *Computer network support specialists*

In the greater LA/OC region, the majority of annual job openings (83%) typically require a bachelor's degree. While the majority of *computer systems analysts* (74%) and *data scientists* (86%) working in the field have completed a bachelor's degree or more education, between 35% and 40% of *computer network support specialists, computer network architects,* and *statistical assistants* have completed some college or an associate degree. Of the 74% of data science and analytics job postings listing a minimum education requirement in the greater Los Angeles/Orange County region, 3% (66) requested high school or vocational training, 3% (77) requested an associate degree, and 94% (2,060) requested a bachelor's degree.

Educational Supply

Community College Supply—Exhibit 6 shows the annual and three-year average number of awards conferred by community colleges in programs that have historically trained for the occupations of interest. The colleges with the most completions in the region are Long Beach, Mt. San Antonio, and Cypress.

Exhibit 6: Regional community college awards (certificates and degrees), 2018-2021

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
0701.00	Information Technology, General	East LA	23	10	4	12
		Glendale	-	-	3	1
		LA Harbor	-	-	1	0
		LA Mission	1	3	1	2
		LA Southwest	-	-	2	1
		Long Beach	34	64	106	68
		Mt San Antonio	74	90	49	71
		Santa Monica	39	-	1	13
		West LA	4	5	-	3
		LA Subtotal	**175**	**172**	**167**	**171**
		Santa Ana	-	-	3	1
		OC Subtotal	**-**	**-**	**3**	**1**
Supply Subtotal/Average			**175**	**172**	**170**	**172**
0702.00	Computer Information Systems	Citrus	5	8	4	6
		Compton	1	-	-	0
		East LA	19	15	23	19
		El Camino	14	21	11	15
		Glendale	-	5	6	4
		LA City	1	1	4	2
		LA Mission	5	1	1	2
		LA Trade	8	20	15	14
		Long Beach	-	-	3	1

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
		Mt San Antonio	-	79	6	28
		Rio Hondo	21	10	6	12
		West LA	8	10	9	9
		LA Subtotal	**82**	**170**	**88**	**113**
		Cypress	5	4	-	3
		Fullerton	15	11	31	19
		Irvine	-	2	-	1
		Orange Coast	4	2	-	2
		Saddleback	-	-	1	0
		Santa Ana	4	2	16	7
		Santiago Canyon	3	4	1	3
		OC Subtotal	**31**	**25**	**49**	**35**
Supply Subtotal/Average			**113**	**195**	**137**	**148**
0707.20	Database Design and Administration	Citrus	1	1	-	1
		Long Beach	3	1	13	6
		Mt. San Antonio	11	12	8	10
		Pasadena	-	4	24	9
		Santa Monica	1	5	2	3
		LA Subtotal	**16**	**23**	**47**	**29**
		Santa Ana	1	8	2	4
		OC Subtotal	**1**	**8**	**2**	**4**
Supply Subtotal/Average			**17**	**31**	**49**	**32**
0707.30	Computer Systems Analysis	Cerritos	2	3	-	2
		East LA	-	1	-	0
		LA City	-	-	1	0
		LA Harbor	-	-	1	0
		LA Mission	-	1	1	1
		LA Pierce	-	-	6	2
		LA Subtotal	**2**	**5**	**9**	**5**
		Cypress	2	-	-	1
		OC Subtotal	**2**	**-**	**-**	**1**
Supply Subtotal/Average			**4**	**5**	**9**	**6**

TOP	Program	College	2018-19 Awards	2019-20 Awards	2020-21 Awards	3-Year Average
0708.10	Computer Networking	Cerritos	11	9	8	9
		Glendale	3	3	-	2
		LA City	23	-	4	9
		LA Pierce	39	20	12	24
		Long Beach	55	47	48	50
		Mt San Antonio	8	11	4	8
		Rio Hondo	5	7	2	5
		West LA	77	48	58	61
		LA Subtotal	**221**	**145**	**136**	**167**
		Coastline	38	59	92	63
		Cypress	70	95	61	75
		Fullerton	-	-	1	0
		Irvine	11	21	10	14
		Saddleback	10	21	19	17
		Santa Ana	14	12	23	16
		OC Subtotal	**143**	**208**	**206**	**186**
Supply Subtotal/Average			**364**	**353**	**342**	**353**
0708.20	Computer Support	Citrus	-	1	1	1
		Glendale	10	7	2	6
		LA Pierce	9	8	6	8
		LA Valley	-	-	1	0
		Long Beach	8	14	40	21
		Pasadena	7	30	34	24
		LA Subtotal	**34**	**60**	**84**	**59**
		Cypress	3	5	3	4
		Santa Ana	9	-	-	3
		OC Subtotal	**12**	**5**	**3**	**7**
Supply Subtotal/Average			**46**	**65**	**87**	**66**
Supply Total/Average			**719**	**821**	**794**	**777**

Non-Community College Supply—For a comprehensive regional supply analysis, it is important to consider the supply from other institutions in the region that provide training programs for these data science and analytics occupations. Exhibit 7 shows the annual and three-year average number of awards conferred by these institutions in relevant programs. Due to different data collection periods, the most recent three-year period of available data is from 2017 to 2020. Between 2017 and 2020, non-community college institutions in the region conferred an average of 803 awards.

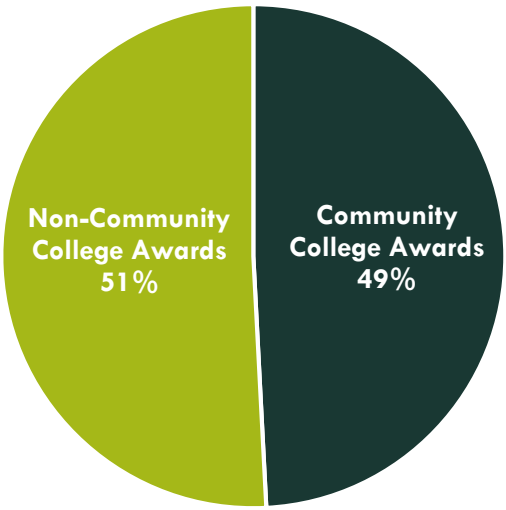
Exhibit 7: Regional non-community college awards, 2017-2020

CIP	Program	Institution	2017-18 Awards	2018-19 Awards	2019-20 Awards	3-Year Average
11.0101	Computer and Information Sciences, General	Azusa Pacific University	26	30	21	26
		Brand College	2	-	-	1
		Brandman University	20	20	30	23
		Chapman University	12	13	18	14
		Los Angeles Pacific College	-	-	6	2
		Loyola Marymount Univ.	42	32	27	34
		Pacific States University	-	2	-	1
		The Master's Univ. and Seminary	6	7	11	8
		UC-Irvine	-	1	-	0
		University of La Verne	18	39	23	27
		University of the People	100	80	203	128
		Vanguard Univ. of So. Calif.	1	-	-	0
11.0103	Information Technology	Abraham Lincoln University	1	1	-	1
		Brand College	37	50	13	33
		CA Intercontinental University	-	-	2	1
		CSU-Dominguez Hills	1	5	4	3
		CSU-Los Angeles	127	122	166	138
		CSU-Northridge	54	54	29	46
		Platt College-Anaheim	1	11	15	9
		Platt College-Los Angeles	-	6	12	6
		Trident Univ. International	87	71	-	53
		University of La Verne	-	3	2	2
11.0199	Computer and Information Sciences, Other	Antioch Univ.-Los Angeles	47	4	-	17
		Brand College	-	2	-	1
		CSU-Dominguez Hills	59	55	65	60
		CSU-Northridge	77	87	73	79

CIP	Program	Institution	2017-18 Awards	2018-19 Awards	2019-20 Awards	3-Year Average
11.0301	Data Processing and Data Processing Technology/ Technician	Premiere Career College	6	1	-	2
11.0501	Computer Systems Analysis/Analyst	Brand College	2	-	-	1
11.0802	Data Modeling/ Warehousing and Database Administration	ABCO Technology	6	7	15	9
11.0901	Computer Systems Networking and Telecommunications	Brand College	-	2	2	1
11.1001	Network and System Administration/ Administrator	ABCO Technology	13	5	25	14
		Brand College	6	23	9	13
		CA Intercontinental Univ.	1	3	1	2
11.1002	System, Networking, and LAN/WAN Management/ Manager	ABCO Technology	7	9	19	12
		Brand College	-	-	1	0
11.1003	Computer and Information Systems Security/ Auditing/ Information Assurance	Learnet Academy	17	-	5	7
11.1005	Information Technology Project Management	CA Intercontinental Univ.	-	1	-	0
11.1006	Computer Support Specialist	Southern California Institute of Technology	26	25	26	26
15.1202	Computer/ Computer Systems Technology/ Technician	Learnet Academy	1	-	4	2
		Supply Total/Average	**803**	**771**	**827**	**803**

Exhibit 8 shows the proportion of community college awards conferred in LA/OC compared to the number of non-community college awards for the programs in this report. About half of the awards conferred in these programs are awarded by community colleges in the LA/OC region.

Exhibit 8: Community College Awards Compared to Non-Community College Awards in LA/OC Region, 3-Year Average



Appendix A: Occupational demand and wage data by county

Exhibit 9. Los Angeles County

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Systems Analysts (15-1211)	14,546	14,876	330	2%	1,107	$37.19	$49.66	$65.98
Computer Network Support Specialists (15-1231)	4,037	4,253	216	5%	341	$25.12	$31.15	$40.05
Computer Network Architects (15-1241)	4,297	4,271	(26)	(1%)	254	$38.24	$54.14	$73.57
Data Scientists (15-2051)	2,926	3,266	340	12%	283	$37.26	$56.26	$70.90
Statistical Assistants (43-9111)	78	84	7	8%	11	$22.44	$35.15	$38.95
Total	**25,883**	**26,750**	**867**	**3%**	**1,996**	**-**	**-**	**-**

Exhibit 10. Orange County

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Computer Systems Analysts (15-1211)	6,076	6,238	162	3%	458	$37.17	$48.45	$63.44
Computer Network Support Specialists (15-1231)	1,583	1,665	82	5%	133	$25.16	$30.79	$39.02
Computer Network Architects (151241)	1,953	1,972	19	1%	120	$37.50	$52.69	$71.14
Data Scientists (15-2051)	1,179	1,322	143	12%	116	$36.93	$55.03	$68.47
Statistical Assistants (43-9111)	23	25	2	8%	3	$21.66	$34.35	$37.13
Total	**10,814**	**11,222**	**408**	**4%**	**830**	**-**	**-**	**-**

Exhibit 11. Los Angeles and Orange Counties

Occupation (SOC)	2021 Jobs	2026 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Typical Entry-Level Education
Computer Systems Analysts (15-1211)	20,621	21,113	492	2%	1,565	Bachelor's degree
Computer Network Support Specialists (15-1231)	5,620	5,918	298	5%	474	Associate degree
Computer Network Architects (151241)	6,251	6,244	(7)	(0%)	374	Bachelor's degree
Data Scientists (15-2051)	4,105	4,588	483	12%	399	Bachelor's degree
Statistical Assistants (43-9111)	101	109	9	8%	14	Bachelor's degree
Total	**36,698**	**37,972**	**1,275**	**3%**	**2,826**	**-**

Appendix B: Sources

- O*NET Online
- Lightcast (formerly Emsi)
- Bureau of Labor Statistics (BLS)
- California Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- Self-Sufficiency Standard at the Center for Women's Welfare, University of Washington
- Chancellor's Office Curriculum Inventory (COCI 2.0)

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