I+D+E: Gestión e innovación desde la perspectiva de los sistemas complejos

Luis Fernando Cruz Ph.D.

19 noviembre 2015

INVESTIGACIÓN –DESARROLLO - INNOVACIÓN

Un reto de gestión……

A new face for the world

¿Como gestionar la Investigación y el Desarrollo para responder, de forma efectiva e innovadora a los retos de la sociedad contemporánea?

ISTEC

Ibero-American Science & Technology Education Consortium

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ISTEC GENERAL ASSEMBLY
ASAMBLEA GENERAL DE ISTEC

XX

MARCH 26-28, 2014
26-28 DE MARZO, 2014

PUEBLA, MÉXICO

INAOE

Online Course co-certified by ISTEC and Universidad Fray Luca Paccioli:
"Certificate Program in Distance Learning for Educators"

February 25th, 3 months duration | SEE ALL EVENTS

Our Vision

ISTEC will be a leading force in fostering socio-economic and educational change in Ibero-America, by creating prosperity and improving the quality of life in the region.

Learn more about ISTEC and our mission here.

Luis Fernando Cruz MD, Ph.D.

ISTEC Ibero-American Science & Technology
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Research and Development (R&D)

Introducing state-of-the-art technology and educational curriculum in academic institutions is pivotal for the social, cultural and economic development of nations. The ISTEC R&D initiative provides a vehicle for performing cutting edge research and development in a variety of disciplines. To achieve excellence, ISTEC, in collaboration with its partners, supports the transfer of technology to develop R&D labs to enhance interaction between industry and academia in order to foster innovation, creativity and collaboration. Therefore, this initiative improves the ability for the latest technology to be applied to the resolution of problems in a variety of areas and encourages the development of solutions that have regional and local social and economic impact.

Search for:

Search

LANGUAGE

English
Español

GA 2014

ACCEDA A TODO EL MATERIAL
DE LA ASAMBLEA EN SEDICI

SEDICI
REPOSITORIO INSTITUCIONAL DE LA UNLP

Robot NAO Cidiacctec Expotic

Complex Systems & Education

SCED ISTEC
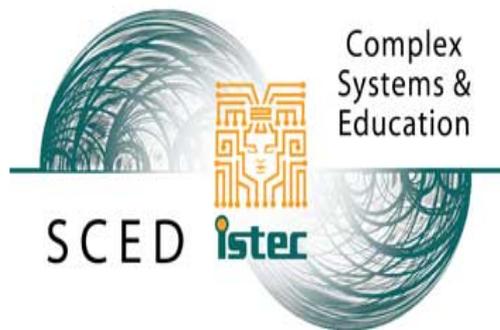
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RESEARCH

- Advising on educational research
- Inter/transdisciplinary and inter-institutional research projects

TEACHING

- Courses, seminars, courses etc. (also virtual)
- Summer Camps at University of South Florida

ASSISTANCE

- Education and Complex Systems (educational management, pedagogy, curriculum learning, etc.)

Misión:

La misión del SCED es fomentar y liderar proyectos de investigación conjunta en Ibero-América con el propósito de fundamentar científicamente la educación del siglo XXI, integrando las diferentes áreas del conocimiento científico y tecnológico como la ingeniería, la nanotecnología, las neurociencias, la biomedicina, la computación bioinspirada, la vida artificial y la simulación, entre otras, mediante un enfoque transdisciplinar, ético y humanístico basado epistemológicamente en el paradigma de los sistemas complejos.

Filosofía:

Los procesos de educabilidad y enseñabilidad deben tener una fundamentación epistemológica acorde con la complejidad de la realidad y con el desarrollo de la ciencia y la tecnología. Dentro de este marco se considera al paradigma emergente de los sistemas complejos el eje sobre el cual se debe realizar la investigación conjunta que permita construir el conocimiento que direccione la educación del siglo XXI.
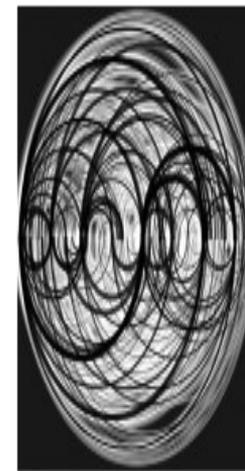
I + D + I + E

APRENDIZAJE -CURRÍCULO   **LIDERAZGO ADAPTATIVO**   **GESTIÓN**

InterDisciplinary Learning Lab (IDLL) @ USF

Organización Mundial de Propiedad Intelectual de las Naciones Unidas OMPI
Solicitudes de patentes internacionales por año

USA:57.000

Japón 44.000

China 22.000

Alemania 18.000

Corea del Sur 12.400

Israel: 1600 (8 millones de habitantes)

América Latina y el caribe :1200 (casi 600 millones de habitantes)

Brasil 600, México 230 , Chile 140 , Colombia 80, Perú 13 Cuba 9 , Venezuela1

Oficina de patentes y marcas de USA 2014

USA:148.000

Japón 54.000

China 6.600

Alemania 16.000

Corea del Sur 16.000

Taiwan 6.600.

Israel: 3.200

América Latina y el caribe :1200

Brasil 290, México 200 , 80 argentina ,Chile 60 , Colombia 20, Perú 3,Bolivia 2

Rankings: publicaciones,artículos, patentes, Ph.D.
Universidades

- USA: primeros 10

- Singapure, China, Corea del Sur: entre los primeros 50

- Latinoamérica no en las primeras 100

Finlandia Education 1996-2014

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Anthropology	5	4	4	5	2	1	5	24	11	13	12	20	22	20	36	61	54	46	60
Archeology	2	5	3	4	1	4	4	8	6	2	6	7	11	17	27	26	24	19	25
Communication	8	4	11	6	4	11	12	17	18	16	36	29	26	45	55	55	61	101	102
Cultural Studies	5	4	24	6	2	5	6	22	15	13	17	22	19	53	64	72	60	93	97
Demography	2	4	11	5	3	9	9	6	16	11	15	6	6	23	15	20	15	20	24
Development	12	9	9	8	9	18	21	41	28	52	45	34	42	55	49	50	72	57	68
Education	30	39	43	47	51	51	73	94	76	140	155	187	212	233	323	322	339	416	413
Gender Studies	2	1	5	4	2	3	3	4	2	11	10	10	11	18	19	24	13	30	25
Geography, Planning and Development	51	47	58	77	74	90	129	101	83	154	146	127	181	175	196	235	254	233	250
Health (social science)	25	29	33	31	39	37	22	42	46	42	52	58	71	90	89	106	110	107	99
Human Factors and Ergonomics	18	20	26	12	43	8	15	22	15	17	21	26	26	25	17	29	26	28	40
Law	14	20	29	13	14	28	20	30	35	37	47	46	52	66	67	77	70	97	116
Library and Information Sciences	15	18	17	21	26	24	21	36	35	41	57	68	49	57	59	80	63	61	71
Life-span and Life-course Studies	1	2	1	2	-	3	2	6	8	7	5	9	8	7	11	18	15	12	13
Linguistics and Language	28	19	22	20	32	39	34	43	38	41	50	63	53	90	90	126	154	144	143
Political Science and International Relations	6	9	6	5	4	4	14	27	20	23	32	20	30	45	63	56	45	68	74
Public Administration	-	4	2	1	4	3	3	5	12	7	7	7	18	20	26	14	25	13	28
Safety Research	8	2	3	1	-	1	3	4	5	5	10	9	17	21	23	17	15	14	32
Social Sciences (miscellaneous)	22	30	32	26	21	40	34	42	38	56	68	65	77	75	96	93	114	136	143
Social Work	6	8	6	5	5	4	6	7	14	5	6	6	13	14	15	18	10	13	19
Sociology and Political Science	26	34	33	31	30	29	43	73	74	76	88	86	103	145	148	152	180	194	220
Transportation	3	3	3	4	7	7	7	6	12	18	19	50	36	36	19	42	47	33	38
Urban Studies	2	3	2	3	4	2	8	6	4	5	4	18	8	10	12	14	12	11	18

China Education 1996-2014

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Anthropology	3	12	7	6	11	12	20	16	20	22	30	35	35	46	492	65	73	66	96
Archeology	3	7	9	8	7	10	9	13	22	20	21	36	24	41	36	61	55	78	96
Communication	-	4	2	7	2	8	6	66	6	17	26	33	37	57	76	206	196	173	410
Cultural Studies	-	2	3	3	3	4	3	3	4	8	25	18	22	86	121	90	109	158	152
Demography	3	8	2	7	4	4	6	8	16	10	9	10	13	16	18	22	43	29	38
Development	10	23	17	27	27	28	51	78	66	67	161	146	165	216	265	252	219	281	343
Education	13	15	23	92	48	124	94	114	240	271	360	452	1.090	1.170	2.477	1.727	1.899	1.787	1.534
Gender Studies	-	2	-	8	1	1	1	1	2	1	5	7	3	13	13	19	21	25	15
Geography, Planning and Development	163	153	159	177	165	204	239	281	336	385	428	475	530	1.025	1.457	1.302	1.467	1.475	1.836
Health (social science)	6	5	7	17	8	5	14	14	21	26	30	45	64	87	129	629	1.184	408	197
Human Factors and Ergonomics	1	3	-	3	7	4	9	4	8	19	20	14	25	41	42	69	80	85	96
Law	6	9	7	11	7	19	20	33	44	63	101	97	529	392	1.569	230	228	309	513
Library and Information Sciences	19	24	20	19	21	17	32	42	194	209	422	294	454	507	607	708	940	1.090	1.104
Life-span and Life-course Studies	1	-	-	2	-	2	1	-	3	3	7	3	6	10	10	23	19	22	45
Linguistics and Language	2	7	11	8	9	9	16	16	38	41	78	90	104	194	661	338	462	501	490
Political Science and International Relations	6	8	11	12	9	23	36	42	39	75	64	60	99	119	178	159	165	239	205
Public Administration	-	1	-	2	3	7	2	8	5	5	9	49	49	185	103	69	99	87	79
Safety Research	1	4	1	1	2	1	1	1	6	2	19	11	38	285	61	58	156	134	464
Social Sciences (miscellaneous)	11	14	11	11	18	20	23	43	236	50	231	306	126	191	568	1.511	391	468	560
Social Work	1	-	-	1	3	5	4	2	5	4	5	8	7	23	30	56	36	34	45
Sociology and Political Science	6	20	13	10	18	20	36	64	69	86	73	91	148	230	317	354	380	478	443
Transportation	13	23	8	13	13	292	16	22	44	126	186	422	1.267	1.897	966	4.550	1.324	1.686	1.840
Urban Studies	2	-	5	1	1	2	5	5	4	9	18	13	23	33	40	38	68	65	77

Brazil Education 1996-2014

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Anthropology	11	10	18	16	7	10	14	12	22	25	60	71	56	95	95	123	147	143	128
Archeology	1	1	8	-	5	1	1	9	5	6	12	14	16	13	10	36	64	59	55
Communication	-	1	3	-	3	4	11	8	6	6	8	44	120	181	131	222	253	256	290
Cultural Studies	2	8	6	5	3	5	5	15	21	17	89	133	140	232	213	226	250	248	276
Demography	4	5	4	5	9	11	5	1	6	5	10	17	27	33	29	31	48	36	34
Development	5	9	15	14	15	13	23	35	27	42	25	165	87	71	82	94	140	135	138
Education	17	19	35	62	54	75	63	70	57	68	267	387	484	591	693	897	958	1.040	910
Gender Studies	-	1	-	2	1	-	1	2	2	2	54	61	108	79	100	91	84	103	113
Geography, Planning and Development	33	32	33	34	49	50	70	72	94	128	98	295	229	217	294	332	425	405	466
Health (social science)	12	17	11	14	16	13	17	24	24	29	43	103	218	316	311	411	476	479	503
Human Factors and Ergonomics	2	2	8	4	92	4	5	4	2	8	11	9	19	16	8	9	30	18	32
Law	8	11	10	17	3	10	14	17	19	20	31	31	36	35	38	46	51	128	109
Library and Information Sciences	7	4	7	10	4	10	7	14	18	12	46	48	89	93	115	133	137	147	180
Life-span and Life-course Studies	1	1	-	-	-	-	-	1	-	1	1	1	-	1	3	1	52	50	53
Linguistics and Language	6	6	12	5	9	11	15	19	23	24	39	53	91	85	128	128	231	251	231
Political Science and International Relations	3	8	4	4	12	9	8	12	17	20	20	56	81	78	100	115	99	101	104
Public Administration	1	-	-	5	1	-	2	7	3	6	4	49	80	107	93	127	125	117	111
Safety Research	2	4	1	-	-	-	-	1	1	2	7	14	13	25	20	11	26	26	34
Social Sciences (miscellaneous)	19	14	10	15	25	31	34	32	36	44	90	213	233	233	340	285	246	297	300
Social Work	2	1	1	1	1	1	-	-	1	-	2	4	2	5	3	6	3	3	3
Sociology and Political Science	15	21	21	14	29	40	26	40	52	52	193	236	288	364	334	485	514	527	588
Transportation	5	8	6	2	8	5	8	6	16	20	8	11	31	18	22	21	27	19	72
Urban Studies	2	2	3	3	7	9	12	11	10	11	12	70	49	51	68	64	89	113	94

México Education 1996-2014

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Anthropology	14	10	12	13	14	8	14	17	13	18	20	22	39	36	27	41	63	71	51
Archeology	1	4	3	1	9	4	2	3	3	7	8	12	11	11	19	14	48	101	98
Communication	-	-	1	2	1	2	3	1	-	5	8	3	6	15	11	21	21	27	44
Cultural Studies	5	6	9	8	4	5	9	8	11	14	15	18	29	45	45	56	70	78	79
Demography	3	4	2	7	2	4	3	8	-	6	10	9	23	31	26	38	35	36	28
Development	9	14	14	16	21	24	22	47	38	34	24	30	37	50	58	44	64	58	59
Education	15	18	22	19	16	32	20	22	43	50	78	67	102	148	187	197	254	267	254
Gender Studies	-	1	2	1	2	-	2	4	-	10	8	9	5	9	7	3	4	8	10
Geography, Planning and Development	25	28	35	30	36	65	54	67	89	107	93	92	114	120	139	131	171	169	155
Health (social science)	13	5	10	8	8	8	7	8	10	8	34	25	26	29	35	41	56	58	53
Human Factors and Ergonomics	-	3	-	2	1	2	-	1	1	7	4	5	8	7	6	2	3	3	11
Law	4	4	5	5	9	1	10	6	6	10	18	17	15	42	33	46	49	70	71
Library and Information Sciences	3	3	7	6	3	4	9	4	3	21	38	26	38	45	31	40	44	56	42
Life-span and Life-course Studies	1	-	-	-	-	-	-	1	-	1	-	1	-	1	-	2	1	2	2
Linguistics and Language	3	4	5	12	14	16	5	6	2	9	13	15	12	23	18	44	56	50	45
Political Science and International Relations	2	1	7	2	11	7	19	21	22	19	31	38	25	38	33	40	61	50	42
Public Administration	-	2	2	1	6	1	5	5	4	22	5	6	9	12	15	16	20	16	17
Safety Research	-	-	-	-	-	-	-	1	-	3	5	1	6	6	9	4	9	4	8
Social Sciences (miscellaneous)	16	22	12	17	9	12	21	24	26	24	24	34	95	86	75	99	107	98	125
Social Work	1	-	1	-	-	-	-	3	-	-	1	-	2	1	3	2	3	1	3	3
Sociology and Political Science	15	24	21	21	21	25	26	33	35	42	48	56	64	77	80	124	158	157	199
Transportation	-	-	1	1	1	-	4	3	-	1	-	4	3	4	5	4	3	7	14
Urban Studies	2	2	4	5	1	4	3	2	2	2	6	4	5	18	17	24	28	26	46

Colombia Education 1996-2014

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Anthropology	2	3	1	4	1	6	1	1	1	3	3	6	3	7	6	24	25	35	24
Archeology	-	2	-	-	1	3	-	1	1	2	1	1	2	2	4	5	11	12	21
Communication	-	-	-	-	3	-	-	-	2	1	1	3	5	4	7	13	17	38	47
Cultural Studies	-	1	-	-	-	-	1	1	2	-	3	6	5	7	9	16	16	32	48
Demography	-	-	-	-	1	-	1	1	1	-	-	2	6	1	3	-	9	7	1
Development	2	2	8	2	5	2	6	18	5	9	11	16	13	10	16	33	25	28	39
Education	4	1	3	2	2	5	5	2	1	5	7	17	39	43	66	95	94	102	102
Gender Studies	-	-	-	1	-	-	-	-	-	-	2	-	2	4	2	2	4	4	6
Geography, Planning and Development	6	4	5	4	11	8	8	15	9	11	7	25	18	44	43	48	74	99	64
Health (social science)	1	2	1	4	2	-	1	1	4	9	6	6	7	20	20	25	33	29	37
Human Factors and Ergonomics	-	-	-	1	2	-	-	-	1	1	-	2	1	3	1	2	3	3	26
Law	-	-	-	1	3	2	2	3	3	3	2	6	6	12	17	25	41	61	49
Library and Information Sciences	2	1	-	-	5	-	-	-	-	-	2	9	6	5	8	8	19	25	19
Life-span and Life-course Studies	-	-	-	-	-	-	-	-	1	-	-	1	3	3	1	-	1	-	-
Linguistics and Language	2	1	-	-	3	1	-	-	-	1	-	3	7	4	7	11	14	34	38
Political Science and International Relations	1	1	2	-	-	2	-	9	2	8	4	14	16	45	45	65	67	48	103
Public Administration	-	-	-	1	-	-	-	-	1	-	-	-	12	10	15	25	27	27	18
Safety Research	-	-	-	-	-	-	-	-	-	1	2	1	4	2	10	1	3	2	8
Social Sciences (miscellaneous)	3	5	1	1	2	2	5	5	7	2	6	8	11	57	60	54	61	69	62
Social Work	-	-	-	1	1	-	1	-	-	-	-	-	1	4	-	2	1	2	1
Sociology and Political Science	4	2	3	2	4	5	4	9	5	12	3	20	39	61	79	94	105	121	139
Transportation	-	-	1	-	-	1	-	2	1	2	3	2	1	6	2	4	12	7	7
Urban Studies	-	-	3	1	-	-	-	2	3	1	1	1	2	12	16	20	31	55	24

Education 1996 -2014

	Ecuador	Venezuela	Peru	Bolivia
1996	1	6	0	0
1997	0	3	0	0
1998	1	7	0	2
1999	1	3	1	0
2000	0	8	0	0
2001	0	5	4	0
2002	0	4	3	0
2003	1	6	3	0
2004	0	2	1	0
2005	1	9	1	1
2006	0	7	7	2
2007	0	18	3	5
2008	3	19	5	0
2009	2	30	4	2
2010	8	28	10	1
2011	9	19	20	3
2012	6	14	22	3
2013	7	13	14	0

27% jóvenes América Latina:Universidad

69% Países industrializados

Singapure, China.. mas tiempo de estudio..
Finlandia….

OCDE

R&D

Research & Development

Gestión Aprendizaje

REAL ACADEMIA ESPAÑOLA

complejidad.

1. f. Cualidad de complejo.

REAL ACADEMIA ESPAÑOLA

complicado, da.

(Del part. de *complicar*).

1. adj. Enmarañado, de difícil comprensión.

2. adj. Compuesto de gran número de piezas.

REAL ACADEMIA ESPAÑOLA

complejo, ja.

(Del lat. *complexus*, part. pas. de *complecti*, enlazar).

1. adj. Que se compone de elementos diversos.

2. adj. **complicado** (‖ enmarañado, difícil).

"Measures of complexity: a nonexhaustive list. IEEE control Systems (Lloyd, S 2001)

Paisajes monte Fuji

Camera Controls
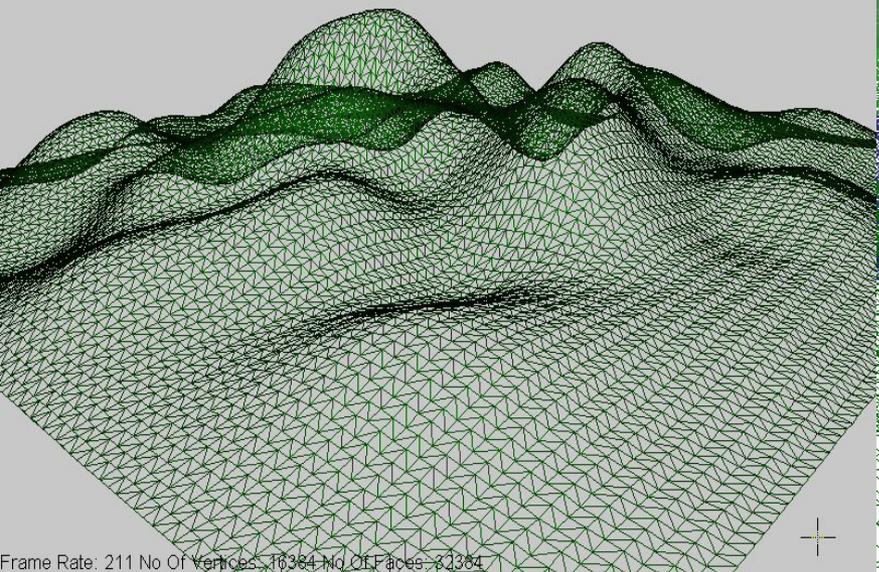
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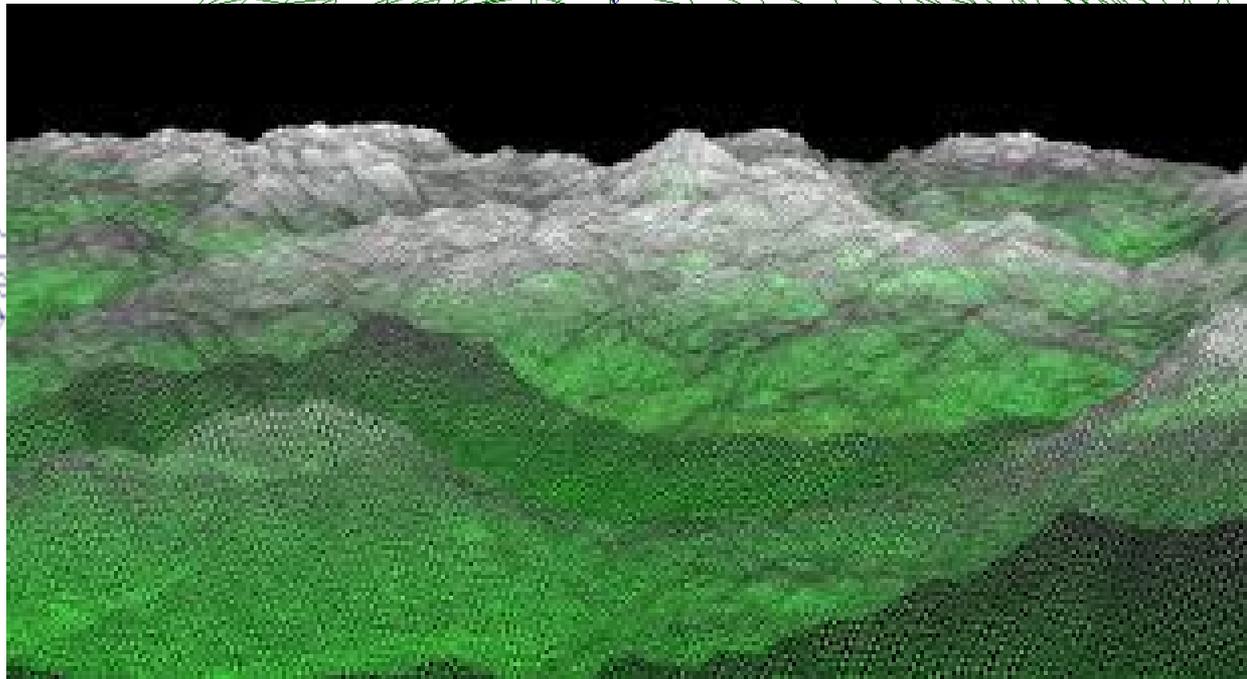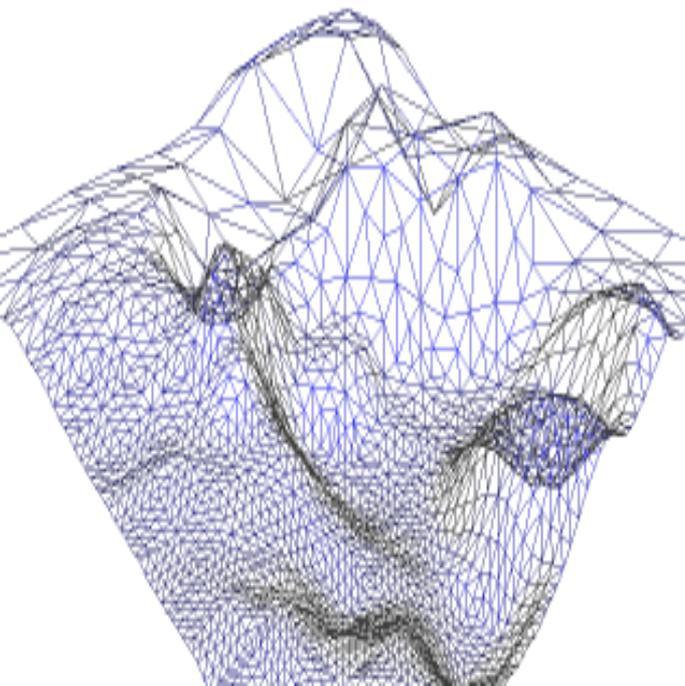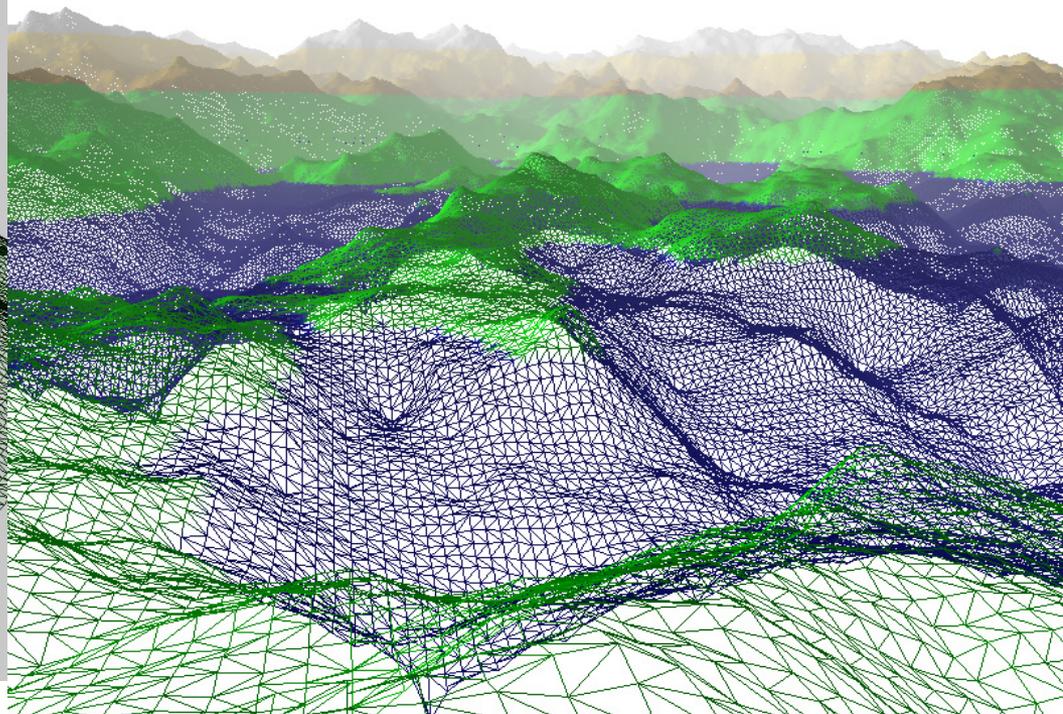
Rup**t**uras,

discontinuidades,   cambio**S**úbitos…

DISRUPTION
REVOLUTION

dis rup tion

¿ Complicado o complejo?

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               .001.^
               u$0N=1
               z00BAI
              |..=~.
             ;s<'''
             NRX~=-`
             z0c^CX^
             ~B0s~^`
              00$H~'
             n$0=XN;.`
            iBBB0vU1=~'`
            `$000cRr`vul
             FAHZuqr-'
             ZZUFA@FI.`
            ;BRHv n$U^-
           `ARH1    ^@si
           'Onv~     01.'
            c0qr     rs.`
            aUU`      ul`
           `R0-        :.`
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           =1^'..`      `..`
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RE-EVOLUCIONES EN LA GESTIÓN

RE-EVOLUCIONES EN LA GESTIÓN

Project Management
for Reseach and Development

Traditional Project Management

(Waterfall)

Spiral Development

RAD (Rapid Application Development)

ASD (Adaptive Software Development

EVO (Evolutionary Project Management)

Agile Method

XP13 (Extreme Programming)

The Crystal Family

Project Management for Research and Development
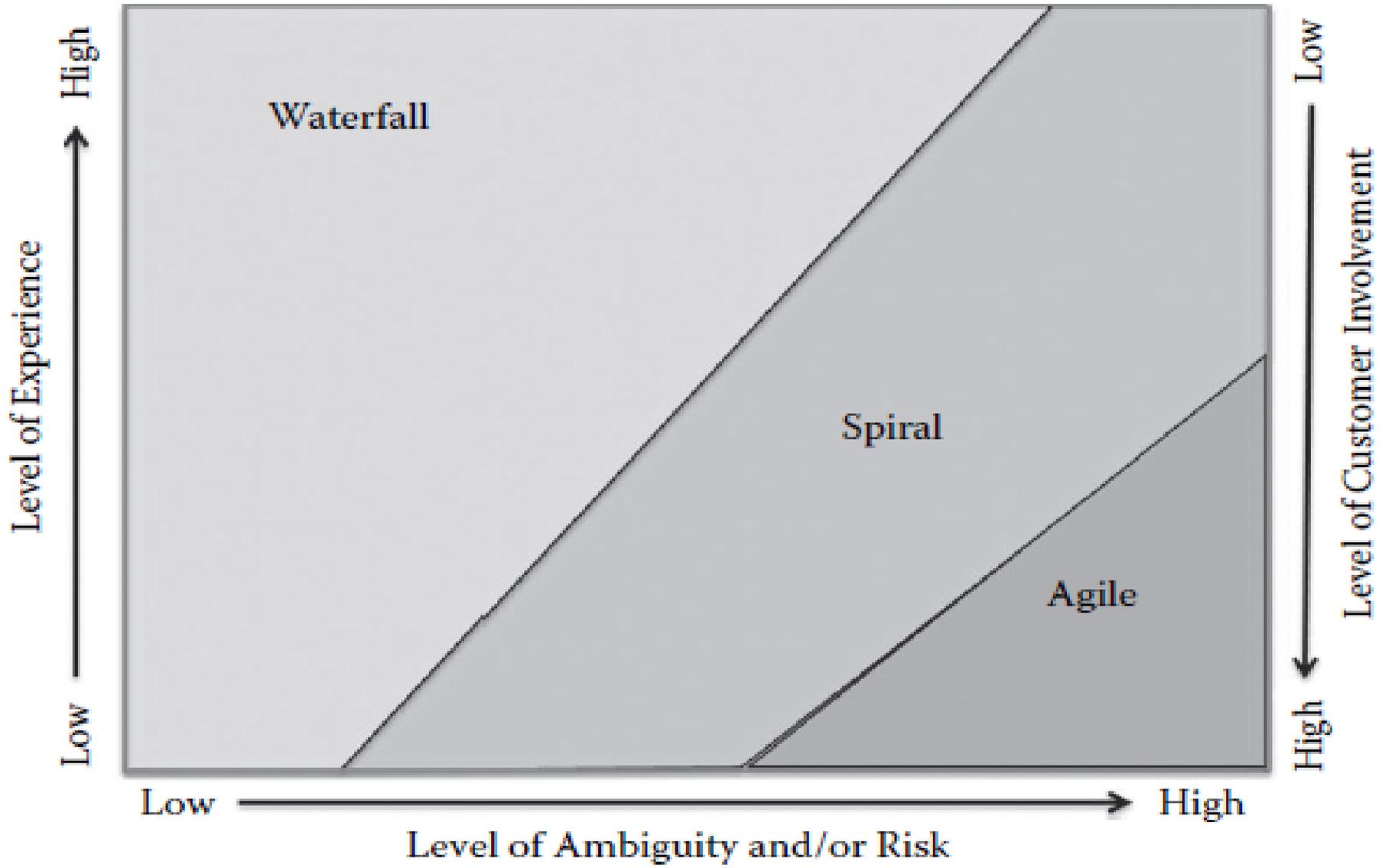
Mitchell Wingate 2015

¿Que hay detrás de documentos y procesos?
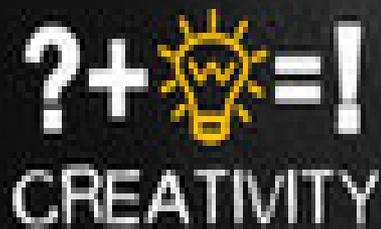
Innteraction

SOLUTIONS

Flat Design Business solution, business development process,
Flat design style modern vector illustration concept.

WHO WE ARE

WHAT WE DO
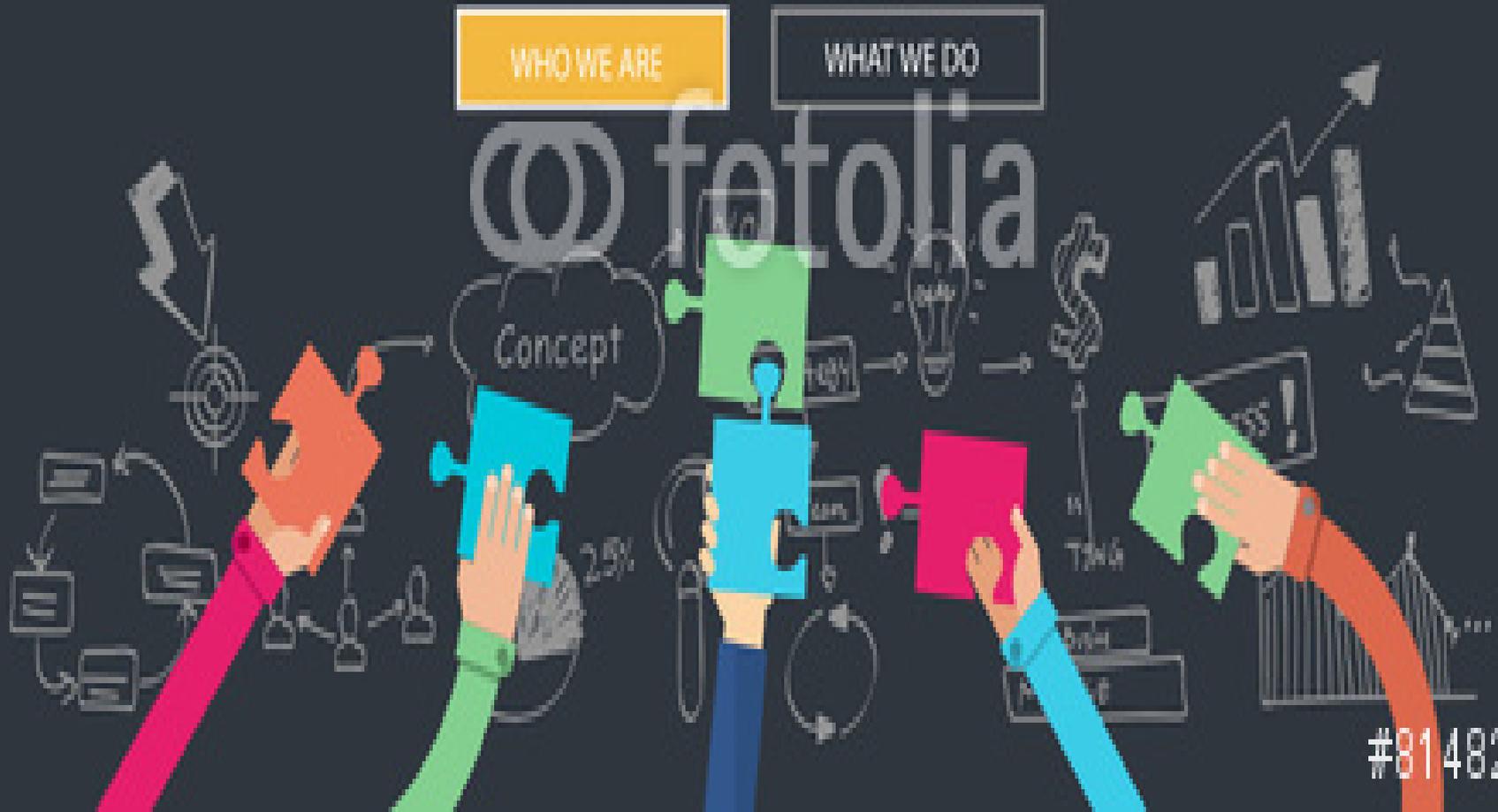
2020 SCIENCE

Science and everyday life cannot and should not be separated.

(Rosalind Franklin)

Gracias

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