

COST

Domain Committee "Biomedicine and Molecular Biosciences"

COST Action BM0605

Start Date 20/09/2007

*Consciousness:
A transdisciplinary, integrated approach*

MONITORING PROGRESS REPORT

Reporting Period: from 20/09/2007 to 31/01/2010

This Report is presented to the relevant Domain Committee.
It contains three parts:

- I. Management Report** prepared by the COST Office/Grant Holder
- II. Scientific Report** prepared by the Chair of the Management Committee of the Action
- III. Previous versions of the Scientific Report;** i.e., part II of past reporting periods

The report is a "cumulative" report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.D. Self evaluation*.

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

Executive summary (max.250 words):

The main objective of the Action is to increase our understanding of (1) the defining features, (2) the behavioural markers, (3) the computational principles, and (4) the neural mechanisms associated with conscious experience in humans and animals, and to identify the clinical, societal, and ethical implications of such findings. These objectives are achieved by coordinating ongoing research dedicated to consciousness in Europe so as to make it possible to achieve the close interdisciplinary interactions that are necessary to advance knowledge in the domain.

2009 was a landmark year for BM0605, with three major events organized: The Summer School in Cargèse, organized late May/early June, the Berlin meeting in early June, which took place in connection with the 14th Meeting of the ASSC, and finally the Cyprus meeting in November, which was, significantly, jointly organized with BM0601 (Neuromath). The summer school proved extremely valuable in fostering new Short-Term Scientific Missions, as made clear by the fact that as 11 new STSM were processed during the reporting period.

I. Management Report prepared by the COST Office/Grant Holder

- **Domain** *Biomedicine and Molecular Biosciences*
- **COST Action** *BM0605 - Consciousness: A transdisciplinary, integrated approach*

- **Action details:**

CSO Approval: 20/11/2006
Entry into force: 28/03/2007

End date: 19/09/2011
Extension: NA

- **Objectives**

The main objective of the Action is to increase the understanding of (1) the defining features, (2) the behavioural markers, (3) the computational principles, and (4) the neural mechanisms associated with conscious experience in humans and animals, and to identify the clinical, societal, and ethical implications of such findings.

- **Parties:**

Parties							
Country	Date	Country	Date	Country	Date	Country	Date
Belgium	28/03/2007	Bulgaria	23/04/2007	Cyprus	28/03/2007	Denmark	28/03/2007
Estonia	22/05/2007	Finland	30/03/2007	Former Yugoslav Republic of Macedonia	28/03/2007	France	01/10/2007
Germany	28/03/2007	Hungary	28/03/2007	Italy	20/04/2007	Netherlands	20/04/2007
Norway	12/06/2007	Poland	28/03/2007	Serbia	27/06/2008	Spain	25/05/2007
United Kingdom	28/03/2007						

Total: 17

Intentions to accept the MoU							
Country	Date	Country	Date	Country	Date	Country	Date
Austria	N/A	Croatia	N/A	Greece	N/A	Israel	N/A
Romania	N/A	Switzerland	N/A				

Total: 6

- **Other participants: NA**

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Ms. Gabriela CRISTEA
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• **Action Web site:** NA

Grant Holder NA

• **Working Groups**

WG1: Chair: Tim Baine ; Vice-chair: Jean-Michel Roy.

WG2: Chair: John-Dylan Haynes ; Vice-chair : Andreas K. Engel.

WG3: Chair: tbd; Vice-Chair: Morten Overgaard

WG4: Chair: Steven Laureys; Vice-chair: Kai Vogeley.

I.B. Management Committee member list

Management Committee		
Chair	Vice Chair	DC Rapporteur
<p>Professor Axel CLEEREMANS Cognitive Science Research Unit Faculte des Sciences Psychologiques et de l'Education Universite Libre de Bruxelles 50 avenue F.-D. Roosevelt CP 191, avenue F.D. Roosevelt, 50 1050 Bruxelles Belgium axcleer@ulb.ac.be</p>	<p>Professor Petra STOERIG Institute of Experimental Psychology IIHeinrich-Heine-University Bldg. 23.03, Universitaetsstr. 1 40225 Dusseldorf Germany petra.stoerig@uni-duesseldorf.de</p>	<p>Professor Srecko GAJOVIC Section for Neurogenetics, Cytogenetics, and Developmental Genetics, Croatian Institute for Brain Reserach, Faculty of Medicine University of Zagreb Salata 12 10000 Zagreb Croatia srecko.gajovic@hiim.hr</p>
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Croatia		
<p>Dr. Selma SUPEK MC Member Faculty of Science N/A - Please update this record Zagreb Croatia selma@phy.hr</p>		
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Estonia		
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Poland		
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Serbia		
<p>Dr Slobodan SEKULIC</p> <p>MC Member</p> <p>Clinical Center Institute of Neurology Hajduk Veljkova 1- 21000 Novi Sad Serbia</p> <p>turija@EUnet.yu</p>		
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Spain		
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United Kingdom		
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I.C. Overview activities and expenditure

Action BM0605 - budget 2010

18-févr-2010

Total Action Budget

175000,00

Remaining Action Commitment

2882,56

Meetings

Meeting Type	Date	Place	Cost	Total
In conjunction with Workshop/Conference	04-juin-2009	Berlin (DE)	56536,88	
Joint Management Committee/Working Group	29-nov-09	Limassol (CY)	41274,36	
Joint Management Committee/Working Group	15-mars-2010	Dubrovnik (HR)	9600	
				107411,2

STSM

Beneficiary	Date	From	Cost	Total
Dr Marcello Massimini	15-mars-2009	Milan (IT)	2500	
Dr Robert Balas	15-juin-2009	Warsaw (PL)	2250	
Ms astrid vermeiren	05-juil-2009	Brussels (BE)	772	
Dr Simone Kühn	13-juil-2009	9000 Gent (BE)	1980	
Ms Urszula Malinowska	24-août-2009	Warsaw (PL)	1020	
Mr Pedro Alexandre Magalhaes de Saldanha da Gama,	15-sept-09	Brussels (BE)	1000	
Dr Dorit Wenke	9-oct-09	Leipzig (DE)	1600	
Dr Emily Cross	4-oct-09	Leipzig (DE)	1820	
Dr Leonhard Schilbach	14-déc-2009	Cologne (DE)	600	
Dr Richard Ramsey	17-févr-2010	Nottingham (UK)	1200	
				14.742

Workshops

Title	Date	Place	Cost	Total
COMA AND CONSCIOUSNESS Clinical, societal and ethical implications	04-juin-2009	Berlin (DE)	3.000	
joint conference with BM0601	29-nov-09	Limassol (CY)	3.000	
				6.000

General Support Grants

Title	Date		Cost	Total
General	25-juin-2009		2.000	
				2.000

Schools

Type	Date	Place	Cost	Total
SCHOOL_LECTURERS	25-mai-2009	Cargese, Corsica (FR)	10773,2	
SCHOOL_ORGANISER	25-mai-2009	Cargese, Corsica (FR)	4880	
SCHOOL_STUDENTS	25-mai-2009	Cargese, Corsica (FR)	26311	
				41964,2

Honoraria

Title	Date	Expert	Cost	Total
				0

Grant

Grant Holder	Date		Cost	Total
				0

Dissemination

Title	Date		Cost	Total
				0

172117,4

II. Scientific Report

The objectives and structure of COST Action BM0605 remained the same during the reporting period (see 2008 Monitoring Report appearing in Title III — Previous scientific reports). The following activities took place since the Action's inception (items relevant for this reporting period appear in bold font):

- **20/09/2007:** 1st MC meeting, Brussels, Belgium
- **06/12/2007:** Core Group Meeting, Brussels, Belgium
- **31/01/2008:** 2nd MC meeting, Brussels, Belgium
- **20/11/2008 — 21/11/2008:** 3rd MC meeting & 1st Joint WGs Meeting , Ghent, Belgium
- **25/05/2009 — 04/06/2009:** **1st Summer School , Cargèse, France**
- **04/06/2009 — 05/06/2009:** **4th MC meeting & 2nd Joint WGs Meeting, Berlin, Germany**
- **29/11/2009 — 01/12/2009:** **5th MC meeting & 3rd Joint WGs Meeting, Limmasol, Cyprus**

II.A. Innovative networking

- *Innovative knowledge resulting from COST networking through the Action. (Specific examples of Results vs. Objectives)*

Several members of the Action have reported benefiting greatly from contacts established over the meetings of the Action. Examples are provided below.
- *Significant scientific breakthroughs as part of the COST Action.*

The most significant scientific breakthrough associated with the Action is undoubtedly the work carried out by Pr. Steven Laureys and his colleagues on the vegetative state. This work attracted considerable attention from worldwide media over 2009-2010, and resulted, amongst other major contributions, in a landmark *New England Journal of Medicine (IF 51)* article published on February 3 (Monti et al., Willful modulation of brain activity in disorders of consciousness, *New England Journal of Medicine*). In this truly breakthrough work, Monti et al. report on how it is possible to use real-time fMRI to elicit reports from patients diagnosed as vegetative or minimally conscious.
- *Tangible medium term socio-economic impacts achieved or expected.*

The Action's work has not resulted so far in "tangible medium-term socio-economic impacts", but again, the work carried out by Pr. Steven Laureys and colleagues on coma and vegetative state has clear and tangible societal consequences in the medium-term, as there could as much as a 40% misdiagnosis rate in such conditions, with patients erroneously diagnosed as being completely unconscious whereas there are clear signs of consciousness when using more sophisticated methods.
- *Spin off of new EC RTD Framework Programme proposals/projects.*

Several members of the Action have reported initiating or planning to initiate EC projects as a direct result of contacts established through the action. For instance, Pr. Maxim Stamenov (BG) reports planning to submit a EUROCORES program in collaboration with Pr. Kenneth Hugdahl (NO), as well as discussing the possibility of submitting a COST Action proposal in collaboration with Pr. Elisabeth van der Gulick (NL). Pr. Silvana Markovska-Simoska (MC) is collaborating with Pr. Andreas Mueller (CH) through ENOC. This collaboration prompted CH to join the Action in 2009 and will continue in the future. Numerous other participants (e.g., Pr. Luis Jiménez, Pr. Daniel Levy, Pr. Jean-Michel Roy, Pr. Manuel Schabus, Pr. Robert Balas, Pr. Leo Schilbach) have reported beginning collaborative work with other action members recently.

- *Spin off of new National Programme proposals/projects.*
Here also, several members of the Action have reported initiating or planning to initiate national or international collaborative projects as a direct result of contacts established through the Action. For instance, Pr. Piotr Durka (PL) reports having obtained funding from the Polish Ministry to collaborate with Pr. Steven Laureys and Pr. Pierre Maquet at the Université de Liège (BE).

II.B. Inter-disciplinary networking

- *Additional knowledge obtained from working with other disciplines within the COST framework.*
Numerous members of the Action have reported benefiting greatly from the transdisciplinary dialogue that the Action facilitates. For instance, Pr. Robert Balas (PL) reports having learned about using electromyography to measure emotional responses via facial muscle activity at the Ghent meeting, and now uses the method extensively in his lab. Pr. Daniel Levy notes that "In addition to the valuable new methods I learned from the presentations by members of the Babiloni and Blinowska groups, I am in conversation with Andy Ioannides about collaboration on the analysis of EEG data collected in my laboratory (relating to the interaction of memory and attention). Such collaboration would not have happened without the facilitation of the action meeting. From my perspective, the activities of the action that bring together researchers focused on topical-theoretical interests with others who are developing new methods of data collection and analysis is a major contribution to advancing research."
- *Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide scientific impacts.*
This Action is probably one of the most interdisciplinary actions currently active in the COST program. It is definitely sufficiently interdisciplinary to promote the emergence of innovative collaborative research. Examples of such impact are provided in the previous paragraph.
- *Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide socio-economic impacts.*
Again, the work of Pr. Steven Laureys illustrates how results achieved with the help of this Action may have socio-economic impact.

II.C. New networking

- *Additional new members joining the Action during its life.*
Switzerland and Austria have both recently joined the Action in 2009.
- *Total number of individual participants involved in the Action work.*
88 people are registered on the BM0605 mailing list, amongst which 25 females and 30 ESR. The actual number of people involved in the Action is probably somewhat higher.
- *Involvement of Early Stage Researchers in the Action, in particular with respect to STSMs, networking activities, and Training Schools. In addition, justification should be provided if less than 4 STSMs were carried out during the year.*
There is solid participation from ESRs to the Action. This was greatly facilitated by the successful training school organized by the Action in Cargèse (France) on 25/05/2009-04/06/2009, in which about 44 students took part. This event resulted in a substantial increase in the number of Short-Term Scientific Missions overseen by the Action. About 9 such missions took place over 2009 (**see attached report in Annex 1**)

- *Involvement of researchers from outside of COST Countries. (Number of participants from non-COST Countries approved by the CSO. Give % of such participants from countries with reciprocal agreements. Specify their contribution)*

There is no active participation from researchers outside of COST countries at this point beyond the participation of invited speakers at the Action's meetings.

- *Advancement and promotion of scientific knowledge through publications and other outreach activities. (Number of publications and other outreach activities that resulted from COST networking through the Action. Complete list should be given in an annex)*

At this point, the Action counts about 35 joint publications between its members, including two books. **See Annex 5.**

- *Activities and projects with COST network colleagues.*
See previous paragraphs for specific examples.
- *The capacity of the Action members to raise research funds.*
See previous paragraphs for specific examples.

Axel Cleeremans
Chair, BM0605

III. Previous scientific report(s)

PART II of Monitoring Report 2008

II.A. Results achieved during the period 31/01/2008 to 31/01/2009

The main objective of the Action is to increase our understanding of (1) the defining features, (2) the behavioural markers, (3) the computational principles, and (4) the neural mechanisms associated with conscious experience in humans and animals, and to identify the clinical, societal, and ethical implications of such findings.

In addition, the following secondary objectives are pursued:

To contribute to our understanding assessment, and treatment of disorders of consciousness, including (1) coma, minimally conscious state, and vegetative state conditions, and (2) certain psychiatric diseases (e.g., schizophrenia)

To promote the emergence of a consensus on the definition of consciousness

To improve both behavioural and brain imaging methods used to explore differences between conscious and unconscious information processing

To improve the design of educational curricula based on current neuroscientific knowledge

To translate neuroscientific knowledge about subjective experience to fields where it can provide wide human benefit, such as education or mental health care.

These objectives are achieved by coordinating ongoing research dedicated to consciousness in Europe so as to make it possible to achieve the close interdisciplinary interactions that are necessary to advance knowledge in the domain. In particular, the Action aims (1) to create, on a European scale, a network of active researchers in the domain, and (2) to foster interactions between junior and senior scientists so as to contribute to the emergence of a “consciousness” community in Europe.

To achieve these objectives, the work has been subdivided into four working groups, as follows:

- **WG1: Fundamentals (chairs: J.-M. Roy & T. Bayne; acting chairs: R. Chrisley & T. Froese).** This WG is focused on the philosophical, theoretical, and epistemological issues that need to be addressed to advance our understanding of the mechanisms that subtend consciousness
- **WG2: Technologies (chairs: A.K. Engel & J.-D. Haynes).** This WG is focused on the integration of novel methodologies for the study of consciousness, particularly on the integration of existing brain imaging methods such as fMRI, MEG and EEG.
- **WG3: Paradigms (chair: R. Balas).** This WG is dedicated to exploring the most promising behavioural paradigms to contrast information processing with and without consciousness, both in humans and in animal models.
- **WG4: Implications (chairs: S. Laureys & K. Vogeley).** This WG is dedicated to the study of altered states of consciousness, to consciousness in pathological cases (such as vegetative state) and in special populations (e.g., blind subjects or synaesthetes), to the design of new assessment scales, and to a consideration of the ethical and societal implications of the findings.

In addition, **P. Haggard** is supervising the Short-Term Scientific Mission Program, in collaboration with **F. de Vignemont** and **K. Yarrow**. Secretarial services for the implementation of the Action have been provided by the COST Office.

Progress with respect the Action Work Plan:

The following Management Committee Meetings were held since the initiation of the action:

- **20/09/2007:** 1st MC meeting, Brussels, Belgium
- **06/12/2007:** Core Group Meeting, Brussels, Belgium
- **31/01/2008:** 2nd MC meeting, Brussels, Belgium

- **20/11/2008:** 3rd MC meeting, Ghent, Belgium

In addition, the Action's first Joint Working Groups Meetings and first Conference was held on 20-21st November, 2008, in Ghent, Belgium. The meeting offered over 30 oral presentations and about 10 posters, and was considered by all participants to be a great success (the full program of the meeting appears in **Annex 1**), particularly in making it possible for the first time for all participating members to meet and discuss collaboration opportunities.

Short-Term Scientific Missions:

Concerning Short-Term Scientific Missions, only one such mission was carried out during the reporting period. Two more have already been approved, but not yet carried out. The STSM coordinator, P. Haggard, reports high interest in the program at this point, and expects many more STSM projects to be approved during the next reporting period. A short report about STSMs appears in **Annex 2**.

Synergistic Activities:

During the Management Committee of 20/11/2008, **J. Pop-Jordanov**, chair of Action B27, presented a proposal to coordinate the different COST actions related to neural sciences in general (B27, B30, BM0601, BM0603 and BM0605) in the form of a "NEURO COST" super-network. This will be actively pursued over the next reporting period. Further, in collaboration with the **F. Babiloni**, chair of Action BM0601, we also plan to hold a joint meeting of the two actions during the coming years. In addition, we have been closely cooperating with the **Association for the Scientific Study of Consciousness (ASSC)** in light of the next meeting of the ASSC, which will be held June 5-8, 2009 in Berlin. On the initiative of **S. Laureys** (co-chair WG2), who organizes a satellite meeting dedicated to "Coma and Consciousness" on June 4th, 2009, that meeting will be open to BM0605 participants, who will have the opportunity to present their work in poster form on June 5th, 2009. A Management Committee will also be organized on this occasion (see preliminary program in **Annex 3**). This occasion is important since it will bring the BM0605 group in contact with participants to the main international scientific society dedicated to the study of consciousness. Finally, we have also been closely collaborating with the **CNRS** and the organizers of the **Cargèse Bi-Annual Summer School on Consciousness** so as offer training opportunities to the young researchers involved in BM0605. This will be held May 25th- June 4th in Cargèse, Corsica (France). The provisional program appears in **Annex 4**.

II.B. Dissemination of results

Action related Publications and Reports (list)

Several joint publications between members of the Action have appeared in 2008 or are now in press:

- Bahrami, B. Carmel, D. Walsh, V. Rees, G. & Lavie, N. (in press) Spatial attention can modulate unconscious orientation processing *Perception*.
- Bahrami, B. Carmel, D. Walsh, V. Rees, G. & Lavie, N. (2008). Unconscious orientation processing depends on perceptual load. *Journal of Vision* 8, 1–10.
- Muggleton, N. Lamb, R., Walsh, V. & Lavie, N. (2008). Perceptual load modulates visual cortex excitability to magnetic stimulation. *Journal of Neurophysiology*, 100(1), 516-519.
- Silvanto, J. Lavie, N. Walsh, V. (2008). The perceptual and functional consequences of parietal top-down modulation on the visual cortex. *Cerebral Cortex* *Advanced online access ISSN: 1047-3211.
- Overgaard, M., FehI, K., Mouridsen, K., Bergholt, B., & Cleeremans, A. (2008). Seeing without seeing? Degraded conscious vision in a blindsight patient. *PLoS One*, 3(8), e3028.
- Sarrazin, J.-C., Cleeremans, A., & Haggard, P. (2008). How do we know what we are doing? Time, intention, and awareness of action. *Consciousness and Cognition*, 17, 602-615.
- Seth, A.K., Dienes, Z., Cleeremans, A., Overgaard, M., & Pessoa, L. (2008). Measuring Consciousness: Relating behavioural and neurophysiological approaches. *Trends in Cognitive Sciences*, 12, 314-321.
- Bayne, T., Cleeremans, A., & Wilken, P. (in press). *The Oxford Companion to Consciousness*, Oxford University Press.

Conferences, Workshops and Training Schools (list and programme)

See **Annex 1** for the program of the First Joint Working Groups Meeting and First Conference, held in Ghent, November 20-21, 2008. See **Annex 3** for the preliminary program of the Second Joint Working Groups Meeting and Conference, to be held on June 4th-5th, 2009, in Berlin. See **Annex 4** for the preliminary program of the First Summer School, to be held May 25th-June 4th, in Cargèse, Corsica (France).

Web site (description)

We are still developing a website for BM0605. In the meantime, a web site currently exists for Short-Term Scientific Missions (see www.informatics.sussex.ac.uk/research/paics/groups/STSM). We have also set up an electronic mailing (BM0605@lists.ulg.ac.be) list so as to make it possible to quickly exchange information with the entire group.

Scientific and Technical Cooperation

Contacts have been established with **P. Pop-Jordanov** to consider the possibility of setting up a "super-network" of neurosciences-related COST actions. Contacts have also been established with **F. Babiloni** (chair of BM0601) to consider the possibility of organizing a joint meeting of the two actions. Cooperation with the Association for the Scientific Study of Consciousness, as well as with the CNRS, will result in joint meetings and summer schools during the next reporting period.

Contacts in the ERA

There is close cooperation between this Action and the NEST program "Mindbridge", also about consciousness.

Axel Cleeremans
Chair, BM0605

ANNEX 1

Report from the STSM Manager

COST BM0605 Short Term Scientific Missions

Report by Patrick Haggard, STSM Chair and Organiser 31/1/2010

Background

Short Term Scientific Missions were seen as an important part of this action from the beginning. Interdisciplinary training in consciousness research methods is a particular important aspect of research in this domain. While there were few applications in the early stages, applications picked up strongly in 2009. I suspect that word-of-mouth advertising among young researchers is responsible for this increase.

Applications and evaluation

Information for applying for STSMs is now provided at a new website:

<http://www.coma.ulg.ac.be/CATIA/research/research.html>

STSM applications are reviewed electronically by a sub-committee comprising:

Prof Patrick Haggard, University College London (STSM Chair and organiser)
Dr Kielan Yarrow, City University, London
Dr Frederique de Vignemont, Institut Jean Nicod-CNRS Paris & NYU New York

Other evaluators are sought in special cases, for example when one of the sub-committee is either the host or a co-worker of the applicant, and a perceived conflict of interest might therefore be possible. STSM reports are evaluated by the STSM chair prior to approval, and transmission to the COST office for payment.

Activity levels

To date 13 STSMs have been approved. Of these, 11 have taken place, and 2 are pending. The geographical coverage has been good, with researchers from the following countries participating: Poland (2), Croatia, Italy (2), Germany (4), UK (2), Belgium (2). The hosts included laboratories in Italy, Germany, Belgium, France, and UK. The sums requested range from €600 to €2500, and the durations from 5 days to 2 months. The disciplines represented include neuroscience, psychology and philosophy. Detailed financial issues are efficiently handled by the COST office.

My general impression is that the STSMs are now running efficiently, and play a valuable role in offering early-stage researchers diverse training opportunities in consciousness research, particularly in research methods. I am happy to continue organising STSMs for the remaining period of the action. During this period, the main targets for the STSM group should be to further increase the spread of STSM applicants geographically.

Patrick Haggard, London, 31 January 2010

ANNEX 2

Cargèse Summer School on Consciousness
25/05/2009 — 04/06/2009

ANNEX 3

Berlin Meeting

**4th MC meeting & 2nd Joint WGs Meeting
04/06/2009 — 05/06/2009**

ANNEX 4

Cyprus Meeting

**5th MC meeting & 3rd Joint WGs Meeting
29/11/2009 — 01/12/2009**

ANNEX 5

Publications list

Books

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